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APPLICATION OF VEHICLE ROUTING HEURISTICS TO AN AEROMEDICAL AIRLIFT PROBLEM

THESIS

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AFIT/GST/ENS/90M-3

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The purpose of this ~~research~~ (thesis) was to construct a network of optimal routes for an aeromedical evacuation system, limited to thirty MD-80 aircraft. The research had three objectives: 1) to allocate thirty aircraft among the hub airports, 2) to construct optimal routes to and from each hub, and 3) to identify any hospital bed shortages. Analysts at the Military Airlift Command requested the research as part of an effort to formulate a wartime, ninety-day operations plan.

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APPLICATION OF VEHICLE ROUTING HEURISTICS TO AN AEROMEDICAL AIRFLIFT PROBLEM

THESIS

Presented to the Faculty of the School of Engineering

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the

Requirements for the Degree of

Master of Science in Operations Research

Michael D. Burnes, B.S.

Captain, USAF

March 1990

Preface

The purpose of this research was to construct a network of optimal routes for an aeromedical evacuation system, limited to thirty MD-80 aircraft. Analysts at the Military Airlift Command requested the research as part of an effort to formulate a wartime aeromedical operations plan.

The research applies vehicle routing heuristics in a deterministic fashion to allocate aircraft, generate flight routes and identify hospital bed shortages over a ninety-day period. Although the resulting routes vary too much from day to day to be suitable for an operations plan, the research does prove that thirty aircracft are sufficient to operate the airlift system.

In performing this research, I wish to thank my advisor, Dr. Yupo Chan, whose guidance kept me out of leftfield, and whose support made me believe in my ability to finish this thesis. I am also indebted to Capt. Brand Carter, who never refused to answer my phone calls as we struggled with the same topic. Finally, I wish to thank Andrea for her love and encouragement during a very difficult time.

Michael D. Burnes

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Abstract

The purpose of this research was to construct a network of optimal routes for an aeromedical evacuation system, limited to thirty MD-80 aircraft. The research had three objectives: 1) to allocate thirty aircraft among nine hub airports, 2) to construct optimal routes to and from each hub, and 3) to identify any hospital bed shortages. Analysts at the Military Airlift Command requested the research as part of an effort to formulate a wartime, ninety-day operations plan.

The research accomplished the objectives by use of a modified Clarke-Wright heuristic combined with a split delivery heuristic. Flight routes were proven to be sensitive to minor changes in daily patient loads and would be unsuitable for an operations plan. The research also determined that thirty aircraft are sufficient to operate the entire airlift system, however, the system has large shortages of orthopedic, surgical and burn injury beds.

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APPLICATION OF VEHICLE ROUTING HEURISTICS TO AN AEROMEDICAL AIRLIFT PROBLEM

Problem Background

I. Introduction

In 1984 the Military Airlift Command (MAC), headquartered at Scott AFB, Illinois, published a Patient Distribution-Redistribution Study which predicted a shortage of C-141 missions available for aeromedical evacuation of expected American casualties during a European conflict. To counter this deficiency, the Secretary of the Air Force, with support from the Air Force Surgeon General and the Secretaries of Defense and Transportation, assigned eighty-five Boeing B-767 and thirty McDonnell-Douglas MD-80 aircraft of the Civil Reserve Air Fleet (CRAF) to perform aeromedical missions (1:7). Under the new concept of wartime operations, the B-767 aircraft will evacuate patients from theaters of operations to civilian and military airfields in the U.S., thus freeing C-141s for traditional cargo airlift. MD-80s will then transport patients to more distant hospitals as required. The MD-80s would replace Air Force C-9 aircraft, which will deploy overseas to perform intratheater aeromedical evacuation

(1:7). With more aircraft available to transport casualties, MAC planners and analysts began designing a new wartime airlift routing system. This research is part of that effort.

II. Discussion

Research Objective

The purpose of this research is to construct a network of routes for thirty MD-80 aircraft capable of delivering as many patients as possible from hub airports to distant airports over a ninety day period.

Problem Background

The problem of developing a worldwide aeromedical airlift system capable of transporting thousands of patients daily is quite complicated. Analysts at the MAC Plans Office (XPY), working with representatives from the MAC Surgeon General's (SG) office, will determine the optimal routing of the B-767 fleet. These aircraft will distribute up to 4500 patients each day to nine hub airports located at Atlanta, Charlotte, Philadelphia, Boston, Chicago, Denver, San Francisco, Los Angeles and Houston. Each hub has an associated network of two to ten distant airports. Regulators, located in the combat theaters, will give each patient a category designation based on the predominant injury (2). The categories, with their corresponding

category numbers in parenthesis are: general medical (1), psychological (2), surgical (3), orthopedic (4), spinal cord (5), and burn injury (6).

Upon arrival at a hub, stateside regulators will assign patients to appropriate local hospitals or to hospitals at distant locations. Regulators hope to proportionally distribute patients between local and distant hospitals so that bed space is always available near the hub airport (3).

In the current peacetime system, C-9s, under direction from the Patient Airlift Center (PAC) at Scott AFB, transport several hundred patients each month across the U.S. (2). The flights are scheduled daily, based on patient requirements. Once the C-9 fleet deploys overseas to fulfill wartime responsibilities, the PAC will take control of the MD-80s. The aircraft will fly from each hub in a "hub and spoke" operation.

In the hub and spoke concept, aircraft begin and end each route at the same network hub and fly only to the distant airports associated with that hub. Such an operation is common among delivery services; Federal Express is a good example. Since the patient load will be much larger than that in peacetime, analysts at MAC XPY believe the PAC cannot perform daily scheduling of these missions. For this reason, mathematical methods must be used to predetermine the allocation of aircraft to hubs and the

necessary routes from hubs to distant airports. MAC will publish the available MD-80 routes along with those for the B-767 fleet in a wartime, aeromedical operations plan (2).

Problem Scope and Assumptions

The MD-80 airlift system will eventually consist of three types of missions. The first is the initial distribution of patients from hubs to distant airports. The second is the transfer of patients between hospitals. These missions will ensure patients with multiple category designations receive treatment for all injuries. The third mission is the return of convalescent patients to homes of residence (3). Since inclusion of all three missions would make the problem unmanageable, this research only determines optimal routes for the first mission.

Several assumptions limit the size of the problem. First, the research assumes that airline companies will provide sufficient flight crews, maintenance facilities and logistics to operate each MD-80, and that all distant airports can service multiple MD-80 flights. This assumption ensures that thirty MD-80s will be available each day, and that maintenance problems will not affect the optimal routes. Secondly, the research assumes aircraft do not have to unload all patients prior to ground refueling and that loading and unloading times are constant for each airport. The research also assumes that B-767 aircraft will

distribute patients across the hubs according to each network's bed capacities. Calculations for the patient distribution appear in Appendix D. Finally, since the distances between airports is relatively small, and only stable patients will fly to the U.S. from overseas theaters, the research does not explicitly attempt to minimize patient travel time.

Constraints

In addition to limitations imposed by aircraft fleet size, several other factors constrain the final solution. Aircraft capabilities, including patient capacity and range, locations of distant airports and the availability of hospital beds will determine the number of aircraft and the length and frequency of air routes needed each day.

The MD-80 is a stretched DC-9 which, when converted for the aeromedical mission, can transport forty-eight litter patients (1:8). The aircraft can reach any point in the continental U.S. from each of the nine hubs; however, allowances for crew duty and maintenance hours limit the amount of time an aircraft can fly.

Current MAC regulations limit the aircrew duty day to twelve hours. The duty day includes not only flying time, but mission planning and pre- and post-flight inspections as well (2). Since these duties require approximately one hour before and after a flight, each aircraft can only operate

ten block hours each day. Block hours combine flying and ground times to determine actual operation time of an aircraft. Ground time includes loading, unloading, refueling, maintenance and ground taxi times. Aircraft require one hour for ground operations at each airport prior to takeoff. The research assumes that medical aircraft will have priority status at most airports; therefore, no delays are expected for refueling and takeoff. Aircraft performance characteristics determine flying time. Since distances within each network are relatively short, the research uses symmetric distance to calculate flying times. In other words, the effects of head and tailwinds are considered insignificant.

MAC analysts have already chosen the locations of distant airports. Each hub has several airports associated with it. For example, the hub at Los Angeles has two associated distant airports at Tucson and Luke AFB. A listing of distances between each airport appears in Appendix B. Since MAC/SG has given approval to drive patients to hospitals less than 100 miles from the hub, no MD-80s will carry patients designated for these hospitals (3). The hospitals near each hub and distant airport are all military or Veteran's Administration (VA) facilities. As yet, no civilian hospitals have committed beds to the aeromedical system. Additionally, each hub will have a 250 to 500 bed staging area so that patients will not require

immediate transportation (3).

The daily number of available beds, the number of patients expected, and the recovery rates for each category form the final constraints. A listing of beds initially available by category in the local area of each hub and distant airport appears in Appendix C. These numbers will obviously change as the war progresses and beds are filled. As stated previously, 4500 patients will arrive in the U.S. each day. A breakdown of the total number of patients in each category and their recovery rates appear in Table 1.

Table 1: Patients and Recovery Rates by Category

Category	1	2	3	4	5	6
# of Patients	567	144	1985	1656	31	117
Recovery Rate	16	24	29	50	33	38

Expanded listings of available beds for each day of the war appear in Appendices E through M. Chapter four provides a more detailed discussion on the generation of these appendices.

Research Process

The simplest routing system would consist of roundtrip flights between hubs and single, distant airports; however, the number of distant airports makes this an impossible task for only thirty MD-80s. For this reason, the research must optimize routes by combining, where possible, more than one

airport into individual routes, thus reducing the number of aircraft needed. The research, therefore, has three steps. First, patient loads for each day of the war are calculated based on available beds, numbers of incoming patients and numbers of recovered patients. Routing heuristics determine the optimal routes, and finally, mathematical programs validate the heuristics and results.

The determination of optimal flying routes constitutes the bulk of this research. Aircraft must deliver the maximum number of patients as efficiently as possible. The importance of delivering large numbers of patients is obvious, but route efficiency is also necessary for two reasons. First, efficient routes minimize the number of aircraft needed to fly the entire hub-distant airport network. With only thirty MD-80s available, this feature is very important. Secondly, efficiency ensures an aircraft visits as many airports as possible within aircraft block hour constraints. Such routes use less fuel, which will be a scarce commodity during a worldwide conflict.

Since physicians will assign patients to one of six categories, the routing system cannot simply send patients to any available hospital. Some hospitals will not have facilities to treat each category, therefore the airlift system must have routes capable of delivering patients to particular hospitals.

Once patients are assigned to hospitals, a variation of a vehicle routing heuristic will determine the optimal routes. This heuristic also determines the number of aircraft needed to efficiently operate each airlift network. If the final solution requires thirty or fewer aircraft, the basing problem will be solved. If, however, the final solution requires more than thirty aircraft, some networks must operate with less than optimal routes. MAC could also request additional MD-80s to cover any shortfalls.

Validation ensures that the results are indeed optimal or at least near-optimal. The research compares results from the heuristics to those obtained from a mathematical formulation and to those reported in a similar thesis effort.

III. Summary

Contribution of the Research

This research will develop optimal routes for delivery of a maximum number of patients from hub airports to distant locations. It is not intended to build a daily schedule, but should contribute to the Military Airlift Command's development of an aeromedical operations plan for worldwide conflict. Currently, planners at MAC SG are unsure if thirty MD-80s are sufficient to transport the expected patient load and are unsure if current hospital capacity is adequate (3). This research will help identify any

shorfalls. Finally, the methodology used in this research may help analysts build a daily scheduling decision aid so that PAC commanders will have the flexibility vital to scheduling of airlift operations.

The following chapter presents some examples of literature common to vehicle routing problems. Chapter three discusses the study's methodology, and Chapter four presents the results. Finally Chapter five provides an analysis and critique of the research.

Literature Review

I. Introduction

In recent years, the amount of vehicle routing literature has increased dramatically. Since a discussion of all the available literature would be much too extensive to include in a thesis, this chapter will review representative samples which have some bearing on the problem described in Chapter one.

II. Discussion

Survey Literature

Although survey literature does not provide detailed descriptions of solution heuristics, it does serve as a starting point for the researcher. The two articles in this section define terms and classify problem types common to the research area.

The first article, "Classification in Vehicle Routing and Scheduling" by Golden and Bodin, was the lead paper in a special edition of *Networks* devoted to vehicle routing and scheduling problems. Since the article defines even the most basic terms, including routing and scheduling, it is an excellent survey of the research area. Section two of the article provides a detailed taxonomy based on the problem

characteristics. These include, among others, size of the vehicle fleet, location and nature of demands and vehicle capacities (4:98-99). Section three classifies solution strategies and assigns common solution techniques to each category. For example, the authors classify the Clarke-Wright heuristic as a savings/insertion technique and the Fisher-Jaikumar heuristic as a mathematical programming approach (4:100). Section four outlines a heirarchy of vehicle scheduling problems progressing from the simplest to the more complex. Finally, section five describes three examples of combined routing and scheduling problems. Most importantly, in each section, the authors provide several references for future research efforts.

The second survey article leads a series of papers compiled in the book Vehicle Routing: Methods and Studies. The article, "Modeling and Implementing Issues in Vehicle Routing" by Assad, serves in an introductory role in much the same manner as the Bodin and Golden article. It has four main sections not including the introduction and conclusion. The first, problem definition, defines a problem based on several factors including the problem's macro-level nature, classification, complexity and route characteristics (5:8-16). The second section discusses model formulation and solution strategies. The author explains that issues, such as level of desired detail and the nature of the objective, are important to model

formulation, while solution strategy depends on the availability of proven and alterable heuristics (5:16-25). The third section examines the challenge of implementing a solution. The author considers solution quality and accurate reporting of savings and benefits as the most important aspects of implementation (5:31). Finally, the author devotes the fourth section to the necessity of accurate geographic databases.

Both survey articles provide an excellent overview to vehicle routing research. Both are similar in that they discuss problem definition, classification and solution. Most importantly, both articles give a wealth of references so that the reader may begin an extensive literature search.

Simple Formulations

Mathematical formulations of vehicle routing problems provide a firm foundation with which to study other algorithms and heuristics. Unfortunately, the complexity of these formulations limits their application to the more simple variants of routing problems. The three articles discussed below provide representative samples of the literature in this area.

Golden, Magnanti and Nguyen wrote a frequently cited article, "Implementing Vehicle Routing Algorithms", in 1977. The article presented heuristics and mathematical formulations for the travelling salesman, single depot

vehicle routing and multiple depot vehicle routing problems. All three formulations model the classic version of travelling salesman and vehicle routing problems and are, therefore, fairly simple. All three minimize the distance necessary to completely serve demand points, each of which have known and unvarying requirements. The formulations are straightforward; however, they require large numbers of variables and constraints for even the smallest problems. For example, a single depot problem with three vehicles defines three variables for a single arc (6:117). As a result, a problem with five nodes and thirty arcs must have ninety variables.

"Integer Programming Formulations of Vehicle Routing Problems" by Kulkarni and Bhave offers a more compact formulation for the single and multiple depot problems by including vehicle capacity and cost limitations in unique subtour constraints. Although the mathematical proofs which justify the reduced formulations are complex, the result is simple programs which require fewer variables. For example, in the single depot case, the formulation requires one variable for each arc regardless of the number of vehicles (7:63). The only limitation requires that the vehicle fleet be homogenous (7:63). The savings in computer input and computation time over the Golden formulations are considerable.

Although the Kulkarni-Bhave formulation works well in some instances, Brodie and Waters in "Integer Linear Programming Formulation for Vehicle Routing Problems" discovered that it has a faulty distance constraint. Specifically, the distance constraint sometimes omits distances to and from the depot (8:404). Since Brodie and Waters offer no correction to the constraints, all solutions must be carefully checked for errors.

Unfortunately, these simple formulations cover only a small subset of vehicle routing problems. A second difficulty, even for the Kulkarni-Bhave programs, results from the large numbers of equations and the time required to input them into a computer. For large problems, heuristics offer more efficient solution procedures.

Simple Heuristics

For many realistic problems, the researcher can at best obtain near-optimal solutions using heuristic reasoning (9:407). The following publications illustrate simple heuristics which parallel the simple formulations discussed above.

The familiar Clarke-Wright heuristic first appeared in the article "Scheduling of Vehicles From a Central Depot to a Number of Delivery Points" in 1964. Although the article may be somewhat dated, it has formed the foundation for many vehicle routing heuristics. The authors present their

heuristic as a modification the Dantzig-Ramser method (10:569). In subsequent sections, they prove the validity of the savings approach to vehicle routing and then solve an example problem. This article is important, because its savings approach has become the cornerstone of several heuristics. Improvements to the Clarke-Wright heuristic are numerous. The next publication offers a good example.

In his book, Applied Network Optimization, Mandl devotes a chapter to vehicle routing heuristics. The chapter presents heuristics for Chinese postman, travelling salesman, school bus routing and waste collection problems. The waste collection problem is of interest, because it is a modified version of the Clarke-Wright heuristic. Unlike the original Clarke-Wright version which chooses tours with the maximum distance saving, the modified heuristic chooses tours with the maximum distance savings and the maximum number of nodes, thus minimizing the number of vehicles needed to service the demand points (11:129). A simple example of the heuristic also appears in the chapter.

The Golden, Magnanti and Nguyen article discussed above addresses heuristics as well as simple formulations. One is a modified Clarke-Wright heuristic which, according to the authors, provides quicker and more optimal solutions than the original version (6:124-125). Three modifications account for this improvement. The first is the use of a route-shape parameter that places greater emphasis on the

distances between demand nodes than those between the demand nodes and the central depot (6:125). The second modification only considers savings between nodes that are close to each other, and the third allows more efficient storing of savings calculations (6:125). The article concludes with a discussion of heuristics for multi-depot formulations.

Simple Heuristic Application

Bodin and Beltrami provide an example of vehicle routing applications in article, "Networks and Vehicle Routing for Municipal Waste Collection". The authors used a variant of the Clarke-Wright heuristic to determine the optimal routing of New York City garbage trucks from large waste dumpsters to depots. The application is a variation of the classic vehicle routing problem. The fleet is homogenous and is required to collect trash from large dumpsters and then transport it to local dumps. The dumps act as landfills, and the dumpsters act as nodes. The authors conclude that the solution technique can result in large cost savings for the city (9:407).

Complex Formulations

Since this research does not require use of complex formulations, only one will be discussed here. Fisher, in his article, "Lagrangian Optimization Algorithms for Vehicle Routing Problems", states that new optimization algorithms,

based on Lagrangian relaxation techniques, are now pratical. He argues that optimization algorithms, which offer better solutions than heuristics, are now possible due to the recent explosion of applied vehicle routing work, decreased computation time and better data storage capabilities (12:635-636).

Complex Heuristics

Complex heuristics are becoming more common in vehicle routing literature. Most are designed to handle variations of the classic vehicle routing problem, such as those with time windows or dynamic demands. Three examples are briefly discussed below.

"A Generalized Assignment Heuristic for Vehicle Routing" by Fisher and Jaikumar, presents a heuristic based on a formulation of the vehicle routing problem as a nonlinear generalized assignment problem. The heuristic solves the classic problem by use of an insertion technique in which preselected routes from the depot to "seed" nodes are augmented by the addition of other nodes (13:114-116). In addition to providing the heuristic, the authors review existing formulations, such as Clarke-Wright, and compare their results to results obtained from these formulations. They conclude that the assignment heuristic yields better solutions.

The second article, "Set Partitioning Based Heuristics for Interactive Routing" by Cullen, Jarvis and Ratliff, presents a set partioning model which can interactively solve large routing problems. The heuristic uses the set partioning model to cluster delivery points and then to chain the clusters to obtain optimal routes (14:142). If the decision maker objects to the selected clusters and chains, he may interactively generate new ones. The research is primarily aimed at solving the static dial-a-ride problem, but the authors conclude that the interactive approach can solve more complex problems involving factors such as time or multiple depots (14:143).

The final article, "Savings by Split Delivery Routing", considers the possibility of allowing more than one visit to a single node. The authors, Dror and Trudeau, argue that, in many cases, split deliveries will result in large savings in terms of distance and required vehicles (15:141). Although the article does not offer a mathematical formulation of the heuristic, it does detail the properties of the split delivery heuristic. Briefly, the heuristic checks the solution to the classic vehicle routing problem for split delivery possibilities. If any are found, the heuristic chooses those with positive distance savings (15:145). The authors give a description of the heuristic and close with computational results and conclusions.

III. Summary

This chapter has covered a wide range of vehicle routing literature. The survey articles would certainly serve as an excellent overview for research or classroom instruction in this area. The literature review then progressed from articles discussing simple formulations and heuristics to those discussing more complex varieties. Variations of the heuristics presented in this chapter, such as the Clarke-Wright algorithm and the split delivery heuristic, will prove important to this research.

Methodology

I. Introduction

This chapter separates methodology into four distinct sections. The first, problem definition, defines problem characteristics using terminology common to general vehicle routing problems. The second outlines several key assumptions vital to the selection of a solution methodology. The third justifies use of a modified Clarke-Wright heuristic combined with a split delivery heuristic. Finally, the fourth section discusses validation of the heuristic model.

II. Discussion

Problem Characteristics

The problem stated in Chapter one is a form of the classic vehicle routing problem. The literature generally defines the classic vehicle routing problem as one in which a specified number of vehicles, each with a known capacity, must deliver, at minimum cost, a specified quantity of goods to demand points or nodes, which have a known demand. No two vehicles can visit the same demand point more than once, and the vehicles must completely satisfy all demands.

The MD-80 problem differs in several aspects, which

appear in the discussion below. Each hub, with its associated distant airports, functions as a self-contained network. The hubs act as depots and the distant airports as nodes. One vital distinction between the MD-80 and classical vehicle problem is relevant here. Since the MD-80s can only deliver patients to distant airports which have available beds, the distant airports actually act as supply points and the depot as a single demand point. This unique reversal of roles from the classic vehicle routing problem will not significantly affect the choice of a solution methodology.

As noted in Chapter two, a vehicle routing problem's characteristics completely define the problem itself. Three characteristics are discussed below. These are 1) depot structure; 2) node characteristics; and 3) problem objectives.

Depot Structure.

The nine depots must serve two to ten distant airports. Patients arrive at a deterministic rate for a ninety day time period. Additionally, rough percentages determine the number of patients in each category. The depots are not linked to each other in any fashion and can only serve their associated distant airports. Finally, MD-80s will only deliver a fraction of arriving patients to these airports. The remainder will remain at hospitals in the depot area.

Node Characteristics.

As previously mentioned, the nodes in the MD-80 problem are actually supply points, each with a predetermined number of beds for each patient category. Most importantly, nodal supply is completely deterministic and limited. At some point in the model's ninety day run, nodal supply may not satisfy depot demand. Finally, since patients will enter and leave hospitals each day, nodal supply can change prior to each model iteration.

Problem Objectives.

The classic vehicle routing problem has the single objective of minimizing distance travelled. The MD-80 problem, however, has three objectives. The first is to ensure delivery of as many patients as possible. The second is to determine the most efficient routing between the hubs and distant airports in order to reduce the fleet size needed at each hub, and the third is to identify any shortfalls in the number of MD-80 aircraft or available hospital beds. Since each hub has a medical staging area, and since the distances are relatively short, the research does not explicitly consider timeliness of patient deliveries.

Assumptions

Two key assumptions simplify the research and make the problem more tractable. Both are based on MAC SG procedures

and requests and are, therefore, reasonable.

The first assumption concerns assignment of patients by overseas regulators to hospital beds in the U.S. This research assumes that regulators will not assign patients to beds that do not exist. For example, if fifty orthopedic beds are available in the Los Angeles network, regulators will not send more than fifty orthopedic patients to Los Angeles. Since regulators will have information on available beds, this assumption is not unrealistic. In the above example, if a B-767 headed to Los Angeles has patients assigned to beds in another network, it will simply fly from Los Angeles to the applicable hub, thus eliminating the need for scheduling MD-80 flights between hubs. Of course, all shortfalls will still be reported.

The second assumption concerns assignment of patients by regulators within each network. MAC SG has made the assumption possible by stating that patients should be evenly distributed throughout the networks. To do this, the number of patients in each category assigned to hospitals within a network depends on the percentages of total beds for each category initially available at each hospital. For example, since Tucson has four percent of all orthopedic beds in the Los Angeles network, four percent of all orthopedic patients arriving at Los Angeles will fly to Tucson. This assumption makes the use of complicated assignment heuristics unnecessary.

Solution Methodology

Since there are three problem objectives, the methodology must obviously meet all three. The following discussion argues that a modified Clarke-Wright heuristic combined with a split delivery heuristic is most appropriate for this problem.

Justification.

A cursory examination of the nine networks and the large number of distant airports indicates the need for some type of routing algorithm. If MAC planners chose only simple routes from the hubs to individual airports and back, the routing system would require more than forty-five sorties. Clearly, thirty *MD-80s could not* provide such a service. Also, fuel requirements would be prohibitive in a time of worldwide conflict. For these reasons, distant airports must be combined into larger tours to reduce the number of aircraft needed while delivering as many patients as possible.

There are many methods to solve the optimal routing problem. Three have already appeared in the literature review. Besides the Clarke-Wright heuristic, both Golden and Kulkarni-Bhave have formulations which can solve the classic routing problem. Although these formulations theoretically produce better solutions than the heuristics, they require more computer input time and are limited in

their application. For example, both formulations assume that no node has a demand greater than vehicle capacity. This constraint causes a problem for this research. Of the two formulations, Kulkarni-Bhave is the simpler, since it requires fewer variables, fewer constraints and less input time. This advantage is significant, when considering that the MD-80 problem covers a ninety-day period and requires ninety runs of the formulation with changing supply at the nodes prior to each iteration. Kulkarni-Bhave has three major drawbacks. First, available software, such as MIP-83, do not have the capability to store, update and print changing capacities at the supply nodes. Secondly, the Kulkarni-Bhave formulation assumes vehicle fleet size at each depot is known. This drawback receives further attention below. Finally, the formulation's constraint error makes caution necessary when examining results.

The second objective, determining the number of vehicles needed at each depot to efficiently operate the network, eliminates both Kulkarni-Bhave and Golden from consideration, since both require a fleet size input. A modified Clarke-Wright heuristic, however, can not only provide near optimal routing structures, but can determine fleet size as well. As previously discussed in the literature review, the modified Clarke-Wright heuristic chooses tours with the maximum distance saving and the maximum number of nodes (11:129). This feature reduces the

number of tours and provides a minimum number of vehicles needed at each depot. In addition, a split delivery heuristic can further optimize the routes and reduce the required number of aircraft by allowing more than one aircraft to visit a single distant airport. The research accomplishes the final objective, recording shortfalls in aircraft or available beds, by simple daily bookkeeping. The following sections describe each heuristic in detail.

Modified Clarke-Wright Heuristic.

The modified Clarke-Wright heuristic is a savings-insertion method which selects optimal tours based on their relative savings versus other tours. The heuristic has four steps. These are 1) initialization; 2) recording; 3) selection; and 4) transition (11:129).

The first step, initialization, occurs only once. Here, the heuristic constructs tours which consist of trips from the hub to single distant airports and back to the hub. Obviously, a network with four distant airports will have four tours at this point. The heuristic also computes the time required (T) for each tour, the capacity remaining on each aircraft (C) and the remaining hospital beds (U) at each airport. If U has a value greater than zero or if both U and C equal zero, the tour automatically becomes optimal, provided it does not violate vehicle block hour constraints. This last stipulation is a modification to the original

heuristic and corresponds in some ways to a frequency variable in the mathematical formulation. The heuristic continues to reconstruct the tour until U has a value of zero. Once all tours have U values of zero, the heuristic proceeds to step two.

At step two, the heuristic records the maximum number of nodes in a tour and the tours which consist of the maximum number or nodes.

In the third step, the heuristic combines the tours recorded at step two with all tours having fewer nodes. If only single node tours are available, the heuristic combines these into two node tours. For example, the first visit to this step will result in new tours, each visiting one more airport than those recorded in step two. Once the new tours are constructed, the heuristic calculates tour time, savings (S), capacity remaining on each aircraft (C) and the number of remaining beds. The formula, Toi + Toj - Tij, calculates savings. Toi is the time from the hub to airport i, Toj is the time from the hub to distant airport j, and Tij is the time between airports i and j. The heuristic then determines the current optimal tour by comparing the time savings of every available tour. The heuristic only considers tours which leave no empty beds (U=0) and use no more than ten block hours. The combined feasible tour with the greatest time savings is selected for further processing at step four. If there are no remaining tours with less

than the maximum number of nodes, the heuristic terminates.

Step four performs bookeeping and determines whether the heuristic will terminate or return to step two or three. If a feasible combined tour exists at step three, the heuristic prohibits the airports in the tour from being used in any other tour and returns to step two. If no combined feasible tour is found in step three, the heuristic subtracts one from the maximum node number and returns to step two. If the the maximum node number equals zero, the heuristic selects the remaining one node tours as optimal and terminates.

Split Delivery Heuristic.

Once the modified Clarke-Wright heuristic has found a solution, a split delivery heuristic will search for opportunities to split deliveries to single airports between two or more tours. The heuristic has two main steps described in the paragraphs below.

At step one, the heuristic looks for airports which are candidates for a split delivery. If the supply at a particular distant airport is less than the remaining aircraft capacity of two or more routes, other than the one containing the particular airport, then the airport becomes a split delivery candidate. The search is expressed mathematically as $C1 + C2 + \ldots + Ck >= Pa(k+1)$, where C is the remaining aircraft capacity on routes 1 through k, and

Pa is the supply at distant airport a on route k+1.

The second step determines if a split delivery at a candidate airport will actually result in a distance saving. The savings formula is similar to the Clarke-Wright formula. The heuristic calculates savings on route k as Sk = Tix,jx - Tix,p - Tp,jx + Tbp + Tpa - Tba, where ix and jx are two consecutive airports on route x for x = 1 to k, and b and a are the airports immediately before and after the candidate airport p on route k. Of course, the new split delivery routes cannot violate the ten block hour constraint.

The research computes optimal tours for each network separately. Since there are nine networks, a total of 810 iterations are required with ninety per network. The result will be a daily set of optimal tours, aircraft required and shortages for each network. In this manner, the research accomplishes all three objectives.

Validation

Two approaches can be used to validate the research results. The first is a comparison of results with those obtained from a similar thesis authored by Capt. William B. Carter. The second makes use of a mathematical formulation solved by MIP-83.

Comparison to a Probabilistic Heuristic.

Carter's research addresses the same problem described in Chapter one with one major exception. His thesis, by

examining a distant airport's ability to accept patients as a probabilistic function of bed supply, is, in effect, a stochastic version of the problem. Although his thesis allocates aircraft to hubs for the average day instead of each day, the total block hours obtained from the deterministic research should be approximately equal to the average time, multiplied by ninety, from Carter's stochastic research. According to previous work from Merrill et al, the two approaches should agree within twenty-five percent (16:5). A comparison of results with those obtained by Carter should not only validate the Clarke-Wright and split delivery heuristics, but Carter's space filling curve heuristic as well.

Comparison to a Mathematical Formulation.

A mathematical formulation of the MD-80 problem must include two additions to the classic formulation. First, the formulation requires a frequency variable to allow multiple visits to a single node. Multiple visits are necessary when a distant airport expects more than forty-eight patients or when split deliveries are feasible. Some manner of split delivery equation is also necessary to construct routes which combine to satisfy delivery requirements at some nodes. In effect, these additions serve to relax the two classic constraints which prohibit multiple visits to a node and visits to nodes with demands greater than aircraft capacity.

Unfortunately, this research, due to time limitations and the complexity of the math involved, has been unable to create the formulation; therefore, validation of the heuristic model will require a slightly different approach. The heuristic model consisted of three components. The first was a rule added to step one of the Clarke-Wright algorithm, which designed individual routes to airports expecting more than forty eight patients. In the mathematical formulation, this feature would appear as a frequency variable. The second component is the traditional Clarke-Wright algorithm, and the third is a split delivery heuristic. Since the second component is fairly easy to validate, this section justifies validation of only the traditional Clarke-Wright algorithm.

Removal of the first component, design of multiple visits to a single airport, is easily justified. The heuristic model handles airports which expect more than forty-eight patients by automatically creating individual round-trip routes to each of those airports until forty-eight or less beds remain unfilled. Once every airport has forty-eight or less beds to fill, the model begins standard Clarke-Wright calculations. A simple example justifies the first component.

Consider a network with one hub and two distant airports. All airports are located 100 miles from each

other, and both distant airports expect forty-eight patients. Finally, the problem constrains the number of allowable sorties to two. With this constraint, the most efficient route structures capable of delivering every patient consist of tours described in Table 1.

Table 2: Routes for the Example Network

Structure #	Routes	Mileage
1	hub-airport 1-airport 2-hub + hub-airport 1-airport 2-hub	600
2	hub-airport 1-hub + hub-airport 2-hub	400

Table 2 shows that individual routes to the airports have less distance than two trips containing both airports. This result can be generalized to any situation in which an airport expects more than forty-eight patients regardless of the distances involved. Of course, once airports have forty-eight beds or less remaining, the traditional Clarke-Wright heuristic becomes possible.

Removal of the third component is more difficult to justify. Since the heuristic is a promising means to furter optimize most vehicle routing problems, it should be added to future formulations. In this research, however, the split delivery heuristic proved to be uneccesary for every route structure except for one. Since it played no significant part in this research, the split delivery

heuristic simply does not require validation.

With components one and three removed from the formulation, the research validated the Clarke-Wright component using the Kulkarni-Bhave formulation. Although this formulation has an error in its distance constraint allowing tours that violate the ten block hour rule, simple inspection can detect any errors. The generic formulation appears below.

$$\text{Minimize} \quad Z = \sum_{i=1}^{n} \sum_{i=1}^{n} Tij\ Xij$$

$$\text{subject to} \quad \sum_{i=1}^{n} Xij = 1 \quad \text{for } j = 1,2,\ldots,n-1$$

$$\sum_{i=1}^{n} Xij = 1 \quad \text{for } i = 1,2,\ldots,n-1$$

$$\sum_{i=1}^{n} Xin = V$$

$$\sum_{i=1}^{n} Xnj = V$$

$$Xij = 0 \text{ or } 1 \quad \text{for all } i,j$$

$$Vi - Vj + BXij \le B - Tij \quad \text{for } 1 \le i \quad j \le n-1$$

$$Yi - Yj + LXij \le L - Ei \quad \text{for } 1 \le i \quad j \le n-1$$

In the formulation, Tij is the block hour time from airport i to airport j, n is the number of airports, V is the number of aircraft, B is the total block hours allowed

and equals ten, L is aircraft capacity and equals forty-eight, and Ei is the expected number of patients at airport i. In addition, all Yi, Yj, Vi and Vj are all arbitrary values.

III. Summary

The research problem is a static vehicle routing problem with deterministic supplies and demands. The problem is not considered classical due to nodal supplies being greater than vehicle capacity, the need for multiple visits to each node, and the possibility of split deliveries to any node. Assumptions make the problem more tractable by eliminating the need for assignment or multi-depot heuristics.

The research applies a modified Clarke-Wright heuristic combined with a split delivery heuristic to determine optimal routing and allocation of aircraft at nine hub and spoke networks. This approach, while certainly not elegant, should provide excellent insight into the behavior of the airlift system over a ninety day period and may lead to the development of expert systems for scheduling purposes.

Validation is possible through the use of a mathematical formulation. Also, a comparison of the results with those obtained by Carter will provide even stronger validation. The following chapter discusses the results of the research effort.

Research Results

I. Introduction

This chapter discusses the results of the research. It is divided into three sections. The first concerns the calculation of optimal routes using heuristics described in Chapter three. The second presents some cumulative results in tabular form, and the third presents conclusions gained from validation of those results and heuristics.

II. Discussion

Calculation of the Optimal Routes

The calculation of optimal routes required four steps. First, the research determined the number of beds to be filled at every hub and distant airport for each day of the war. Secondly, a modified Clarke-Wright heuristic generated the necessary routes. Next, a split delivery heuristic attempted to further optimize the routes, and finally, aircraft fleet size required at a hub was determined by selecting the minimum number of aircraft capable of flying the prescribed routes. An example illustrates each step.

Determination of Distant Airport Bed Supplies.

Before performing either heuristic, the research determined the exact number of patients to be delivered.

Calculating the numbers for every network on each day of the war was computationally simple, but very tedious. The results for every airport located more than 100 miles from the hub appear in Appendices E through M.

Initially, the research assumed patients would be distributed among distant airports based on each airport's percentage of beds within its network. This rule was discarded for four of the six categories for two reasons. First, the percentage-wise distributions forced patients in some categories to travel to distant airports when only one hospital could have accomodated every patient. Secondly, the percentage-wise distributions forced aircraft to carry single patients in some categories to only one airport. To remedy these inefficiencies, the research adopted three rules.

The first rule states that if a single hub or airport or a combination of hubs and airports can accomodate every patient in a specific category over the entire ninety day war, provided the combination does not include every airport, the patients will only travel to those airports. For example, the Philadelphia hub has 4209 general medical beds. Since 132 general medical patients arrive in Philadelphia each day, and since these patients require sixteen days to recover, the hub needs only 2112 (132 x 16) beds to accomodate every patient; therefore, every patient

arriving at Philadelphia in this category would remain there. Throughout the research this rule applied to the general medical and psychological categories in every network.

The second rule applies to categories with small numbers of patients. These include the spinal cord and burn categories. This rule reduces inefficiency by eliminating many tours carrying one patient to distant airports. The rule states that patients in these two categories will initially remain at the hub until every bed in the hub area is filled. Patients in these categories travel only to a single distant airport until the airport's beds are filled. The process continues until beds at the hubs again become available or the network simply exhausts it supply of beds in that category. For example, using percentage-wise distribution in the Philadelphia network would have resulted in a tour to Buffalo on day forty-seven to deliver a single burn patient. The second rule eliminates this trip, and others in the network, by routing all sixteen burn patients to Norfolk. Due to rules one and two, the percentage-wise distribution applies only to the remaining two categories: orthopedic and surgical.

Using the modified Clarke-Wright heuristic.

The Philadelphia network serves as an example to illustrate the application of the modified Clarke-Wright heuristic on day one. The numbers of patients scheduled to

fly to distant airports and each airport's International Civil Aviation Organization (ICAO) code appear below in Table 3. ICAO codes for every airport are listed in Appendix A.

Table 3: First Day Patient Loads From Philadelphia

Airport	ICAO code	No. of Patients
Philadelphia	KPHL	-
Syracuse	KSYR	5
Buffalo	KBUF	68
Pittsburgh	KPIT	73
Washington D.C.	KADW	184
Norfolk	KORF	123

Application of step one gives the following calculations:

Route	C	U	T	S	Remarks
KPHL-KSYR-KPHL	43	0	2.34	-	
KPHL-KBUF-KPHL	0	20	2.86	-	Feasible/Select
KPHL-KPIT-KPHL	0	25	3.01	-	Feasible/Select
KPHL-KADW-KPHL	0	136	1.75	-	Feasible/Select
KPHL-KORF-KPHL	0	75	2.25	-	Feasible/Select

Since single airport routes to Buffalo, Pittsburgh, Washington D.C. and Norfolk result in U values greater than zero, the heuristic selects these routes as optimal. Step one states that these routes will be reconstructed using the number of patients which still require transportation.

Route	C	U	T	S	Remarks
KPHL-KSYR-KPHL	43	0	2.34	-	
KPHL-KBUF-KPHL	28	0	2.86	-	
KPHL-KPIT-KPHL	23	0	3.01	-	

KPHL-KADW-KPHL	0	88	1.75	-	Feasible/Select
KPHL-KORF-KPHL	0	27	2.25	-	Feasible/Select

These calculations show that Washington D.C. and Norfolk require additional sorties. Another route reconstruction is necessary.

Route	C	U	T	S	Remarks
KPHL-KSYR-KPHL	43	0	2.34	-	
KPHL-KBUF-KPHL	28	0	2.86	-	
KPHL-KPIT-KPHL	23	0	3.01	-	
KPHL-KADW-KPHL	0	40	1.75	-	Feasible/Select
KPHL-KORF-KPHL	21	0	2.25	-	

Since the route to Washington D.C. still has a U value greater than zero, a third route to this airport and another reconstruction are necessary.

Route	C	U	T	S	Remarks
KPHL-KSYR-KPHL	43	0	2.34	-	
KPHL-KBUF-KPHL	28	0	2.86	-	
KPHL-KPIT-KPHL	23	0	3.01	-	
KPHL-KADW-KPHL	8	0	1.75	-	
KPHL-KORF-KPHL	21	0	2.25	-	

Now that all U values equal zero, the heuristic proceeds to step two where the maximum node number is recorded as one. At step three, the single-airport tours can be combined into two-airport tours.

Route	C	U	T	S	Remarks
KPHL-KSYR-KBUF -KPHL	23	0	4.14	1.07	
KPHL-KSYR-KPIT -KPHL	18	0	4.66	.69	

KPHL-KSYR-KADW -KPHL	3	0	3.98	.11	
KPHL-KSYR-KORF -KPHL	16	0	4.54	.05	
KPHL-KBUF-KPIT -KPHL	3	0	4.51	1.36	Feasible/Combine
KPHL-KBUF-KADW -KPHL	0	12	4.30	.31	
KPHL-KBUF-KORF -KPHL	1	0	4.87	.24	
KPHL-KPIT-KADW -KPHL	0	17	4.23	.53	
KPHL-KPIT-KORF -KPHL	0	4	4.71	.55	
KPHL-KADW-KORF -KPHL	0	19	3.33	.70	

The Philadelphia-Buffalo-Pittsburgh Philadelphia route has the greatest savings of any feasible route; therefore, step three selects it for combination. The route is recorded in step four as feasible, and the heuristic returns to step two. There the maximum node number is set to two, and the heuristic proceeds to step three to create further combinations.

Route	C	U	T	S	Remarks
KPHL-KSYR-KBUF -KPIT-KPHL	0	2	5.77	.90	Unfeasible/Capacity
KPHL-KBUF-KPIT -KADW-KPHL	0	37	5.72	.54	Unfeasible/Capacity
KPHL-KBUF-KPIT -KORF-KPHL	0	24	6.21	.55	Unfeasible/Capacity

None of the three airport combinations are feasible. All have U values greater than zero, thus violating aircraft capacity, and two of the three do no produce a savings. The heuristic now moves to step four and declares the

Philadelphia-Buffalo-Pittsburgh-Philadelphia route optimal. Returning to step two, the heuristic sets the maximum node number to two. At step three, the heuristic searches for the next best two-node combination which does not include Buffalo or Pittsburgh.

Route	C	U	T	S	Remarks
KPHL-KSYR-KADW -KPHL	3	0	3.98	.11	Feasible/Combine
KPHL-KSYR-KORF -KPHL	16	0	4.54	.05	
KPHL-KADW-KORF -KPHL	0	19	3.33	.70	Unfeasible/Capacity

The heuristic selects Philadelphia-Syracuse-Washington D.C.-Philadelphia and records the route at step four. The heuristic sets the maximum node number at two and looks for three-node combinations. Only one possibility exists.

Route	C	U	T	S	Remarks
KPHL-KSYR-KADW -KORF-KPHL	0	24	5.55	.68	Unfeasible/Capacity

Since the combination is not feasible, the heuristic begins looking for two-node combinations. Since none are available, the heuristic terminates and declares remaining one-node tours optimal.

Route	C	U	T	S	Remarks
KPHL-KORF-KPHL	21	0	2.25	-	Feasible/Select

These calculations appear in Appendices E through M for every network. Some minor modifications are noteworthy. First, the values for C and U are either 0 or >0. This feature saves space by allowing the same set of calculations to be used for more than one day. In a few instances some of the C or U values may not be correct; however, these erroneous values in no way invalidate the solution. All errors occured on routes which were never selected for combination due to small savings or unfeasibility.

Using the Split Delivery Heuristic.

The split delivery heuristic applies to modified solutions which produce three or more routes with U values equal to zero. This stipulation eliminates all step-one single-airport routes. In this example, the following routes, listed in Table 4, are available for split deliveries.

Table 4: Routes Available for Split Delivery

Route	#	C	Time
KPHL-KPIT-KBUF-KPHL	1	3	4.15
KPHL-KSYR-KADW-KPHL	2	3	3.98
KPHL-KORF-KPHL	3	21	2.25

First, the heuristic determines if any split deliveries are possible by comparing post-route capacities of two or more routes with an airport demand from another route. The only possibility is a split delivery at Syracuse between route 1 and route 3. The sum of the remaining capacities of

these routes equals 26, which is greater than the demand of 5 at Syracuse.

Once the heuristic determines candidates, it calculates savings using the formula presented in Chapter three. The results of the calculations are as follows.

Route	C	U	T	S	Remarks
KPHL-KSYR-KBUF -KPIT-KPHL + KPHL-KORF-KSYR -KPHL	0	0	12.06	-1.32	No Savings

Since the C values are not important for the split delivery savings calculations, the heuristic sets them to zero. No routes produce a savings; therefore, the optimal routes remain unchanged and appear below in Table 5. The appendices do not list split delivery candidates which obviously produce no savings. These situations and any situations in which split routes are impossible are noted by the comment, "** No Splits Possible **".

Table 5: Selected Routes for Day One

Route	Time
KPHL-KPIT-KBUF-KPHL	4.51
KPHL-KADW-KSYR-KPHL	3.98
KPHL-KPIT-KPHL	3.01
KPHL-KADW-KPHL	1.75
KPHL-KADW-KPHL	1.75
KPHL-KADW-KPHL	1.75
KPHL-KORF-KPHL	2.25
KPHL-KORF-KPHL	2.25
KPHL-KORF-KPHL	2.25

The total time required to fly these routes is 23.50, and the total number of aircraft which can perform these sorties without violating the ten block hour constraint equals four.

Results of the Calculations

The research had three objectives. These were 1) allocate aircraft among the hubs; 2) determine the optimal routes; and 3) identify any shortfalls. Results for the second objective are too lengthy to print in within this chapter; therefore, only total system time appears. All routes appear in Appendices E through M. Results for the first and third objectives are presented in tabular form below.

Allocation of Aircraft.

The following table represents a summary of data contained in Appendices E through M.

Table 6: Daily Aircraft Required

Day	LAX	SFO	BOS	CLT	BKF	PHL	EFD	ATL	ORD	Total
1	1	2	1	1	2	3	4	4	6	24
2	1	2	1	1	2	3	4	4	6	24
3	1	2	1	1	2	3	4	4	6	24
4	1	2	1	1	2	3	4	4	6	24
5	1	2	1	1	2	3	4	4	5	23
6	1	2	1	1	2	3	4	4	6	24
7	1	2	1	1	3	4	3	4	5	24
8	1	1	1	1	2	3	3	3	4	19
9	1	1	1	1	2	3	3	3	4	19
10	1	1	1	1	2	3	3	3	4	19
11	1	1	1	1	2	3	3	3	4	19
12	1	1	1	1	2	3	3	3	4	19

Table 6: (Continued)

Day	LAX	SFO	BOS	CLT	BKF	PHL	EFD	ATL	ORD	Total
13	1	1	1	1	2	3	3	3	4	19
14	1	1	1	1	2	3	3	3	4	19
15	1	1	1	1	2	3	3	3	4	19
16	1	1	1	1	1	2	3	3	4	17
17	1	1	1	1	1	2	3	3	4	17
18	1	1	0	1	1	2	2	2	3	13
19	0	0	0	0	0	0	2	1	1	3
20	0	0	0	0	0	0	1	1	1	3
21	0	0	0	0	0	0	1	1	1	3
22	0	0	0	0	0	0	1	1	1	3
23	0	0	0	0	0	0	1	1	1	3
24	0	0	0	0	0	0	1	1	1	3
25	0	0	0	0	0	0	1	1	1	3
26	0	0	0	0	0	0	1	1	1	3
27	0	0	0	0	0	0	1	1	1	3
28	0	0	0	0	0	0	1	1	1	3
29	1	1	1	1	2	2	3	3	4	18
30	1	1	1	1	2	2	3	3	4	18
31	1	1	1	1	2	2	3	3	4	18
32	1	1	1	1	2	2	3	3	4	18
33	1	1	1	1	2	2	3	3	4	18
34	1	1	1	1	2	2	3	3	4	18
35	1	1	1	1	2	2	3	3	4	18
36	1	1	1	1	2	2	3	3	4	18
37	1	1	1	1	2	2	3	3	4	18
38	1	1	1	1	2	2	3	3	4	18
39	1	1	1	1	2	2	3	3	4	18
40	1	1	1	1	2	2	3	3	4	18
41	1	1	1	1	2	2	3	3	4	18
42	1	1	1	1	2	2	3	3	4	18
43	1	1	1	1	2	2	3	3	4	18
44	1	1	1	1	1	3	3	3	4	18
45	1	1	1	1	1	3	3	3	4	18
46	1	1	0	1	1	2	2	3	3	14
47	0	1	0	0	1	1	1	1	1	6
48	0	1	0	0	1	1	1	1	1	6
49	0	1	0	0	1	1	1	1	1	6
50	1	2	1	1	3	2	2	3	3	18
51	1	1	1	1	3	2	2	3	4	18
52	1	1	1	1	3	2	2	3	4	18
53	1	1	1	1	3	2	2	3	4	18
54	1	1	1	1	3	2	2	3	4	18
55	1	1	1	1	3	2	2	3	4	18
56	1	1	1	1	2	2	2	2	3	15
57	1	1	1	1	2	2	3	3	4	18
58	1	1	1	1	2	2	3	3	4	18

Table 6: (Continued)

Day	LAX	SFO	BOS	CLT	BKF	PHL	EFD	ATL	ORD	Total
59	1	1	1	1	2	2	3	3	4	18
60	1	1	1	1	2	2	3	3	4	18
61	1	1	1	1	2	2	3	3	4	18
62	1	1	1	1	2	2	3	3	4	18
63	1	1	1	1	2	2	3	3	4	18
64	1	1	1	1	2	2	3	3	4	18
65	1	1	1	1	2	2	3	3	4	18
66	1	1	1	1	2	2	3	3	4	18
67	1	1	1	1	2	2	3	3	4	18
68	1	1	1	1	2	2	3	3	4	18
69	1	1	1	1	2	2	3	3	4	18
70	1	1	1	1	2	2	3	3	4	18
71	1	1	1	1	2	2	3	3	4	18
72	1	1	1	1	1	2	3	3	4	17
73	1	1	1	1	1	2	3	3	4	17
74	1	1	0	1	1	2	2	2	3	13
75	0	0	0	0	1	0	1	1	0	3
76	0	0	0	0	1	0	1	1	0	3
77	0	0	0	0	1	0	1	1	0	3
78	0	0	0	0	1	0	1	1	0	3
79	0	0	0	0	1	0	1	1	1	4
80	0	1	0	0	1	0	1	1	1	5
81	0	1	0	0	1	1	1	1	1	6
82	0	1	0	0	1	1	1	1	1	6
83	0	1	0	0	1	1	1	1	1	6
84	0	1	0	0	1	1	1	1	1	6
85	1	1	1	1	2	3	3	3	4	19
86	1	1	1	1	2	3	3	3	4	19
87	1	1	1	1	2	3	3	3	4	19
88	1	1	1	1	2	4	3	3	4	20
89	1	1	1	1	2	3	3	3	4	19
90	1	1	1	1	2	2	3	3	4	18

Total Route Time.

As previously stated, there are simply too many routes to list them all here. Instead, the total route time, rounded to the nearest hour, appears below in Table 7 for each network. These times will be the primary measure of comparison with Carter's thesis.

Table 7: Total Route Times

	LAX	SFO	BOS	CLT	BKF	PHL	EFD	ATL	ORD	Total
Time	296	543	135	222	801	1163	1269	1642	1933	8006

Identification of Shortfalls.

Since thirty aircraft are sufficient to operate the airlift system each day, available beds comprise the only shortfall. These are listed below in Table 8.

Table 8: Bed Shortages by Category

	1	2	3	4	5	6	Total
Shortage	0	0	20,338	69,875	0	2623	92,836

Validation of the Algorithms and Results

Validation of the heuristic model occurred in two phases. In the first, the results reported in Table 7 were compared to similar results from Carter's research. In the second the results were compared to output from a mathematical formulation.

Comparison with Carter's Thesis.

In Carter's initial formulation, he assumed that patients would be distributed proportionally across each network. Since he did not adopt the patient assignment rules discussed earlier in this chapter, his total route times for each network were twenty-five to thirty percent higher than those from this research. To allow for a better comparison, Carter obtained new results after eliminating

the general medical and psychological categories from consideration. The resulting total route times for each network along with the percentage differences between the two solutions appear in Table 9 (17).

Table 9: Carter's Results

Network	Time	% Difference
Los Angeles	319	7.8
San Francisco	580	6.6
Boston	151	11.9
Charlotte	243	9.5
Denver	954	8.2
Philadelphia	1184	1.5
Houston	1334	5.1
Atlanta	1737	5.8
Chicago	1942	2.0
Total	8474	4.8

Comparison to a Mathematical Formulation.

As stated in Chapter three, the research has no formulation for the modified Clarke-Wright heuristic or the split delivery heuristic; however, formulations do exist to validate the traditional Clarke-Wright portion of the heuristic model. One of these, the Kulkarni-Bhave formulation, is used to validate the results obtained by the heuristic model after individual round-trip tours have reduced all loads to forty-eight patients or less, and before the split delivery heuristic has attempted to further optimize the routes.

Since time limitations do not allow validation for every

network on every day, the research has chosen days one and eight of the Philadelphia network. The Philadelphia network is chosen, because solutions for a network with five nodes are not trivial and the computer input time is not excessive. Day one is chosen, because it requires the maximum number of aircraft, and day eight is chosen, because patient loads allow combination of more than two airports into a tour.

The sample is admittedly small; however, the Clarke-Wright heuristic has proven reliable for many years. In reality, the Kulkarni-Bhave formulation would serve a more useful purpose as an accuracy check for the calculations in Appendices E through M than as a validation method. It is also important to point out that the formulation does not determine the optimal number of aircraft. These were obtained from the heuristic output. This fact indicates that validation of the results relies more on the historical record of the Clarke-Wright heuristic and on the comparison with Carter's results than on the formulation. Patient loads for the formulations appear in Table 10. In both cases, individual round trip tours have reduced all loads to forty-eight patients or less.

Table 10: Patient Loads for Validation

	KSYR	KBUF	KPIT	KADW	KORF
Day 1	5	20	25	40	27
Day 2	3	38	5	44	15

In both cases, the formulation agrees with the Clarke-Wright component of the heuristic model. The actual formulations as input into MIP-83 appear in Appendices N and O.

III. Summary

This chapter has discussed computational results from the research effort. These include allocation of aircraft, aircraft routing and bed shortages. Examples of some of the calculations provide insight into the processes that generated the results. In addition the chapter presents the results from the validation of the research effort. A discussion and interpretation of these results appears in the next chapter.

Analysis of the Results

I. Introduction

This chapter interprets the results reported in Chapter four, discussing the three objectives of aircraft allocation, route generation and shortage identification, followed by an analysis of the validation process. Finally, the chapter summarizes the thesis with a critical review of the solution approach and by presenting some suggestions for future research.

II. Discussion

The main thrust of the research was to find an efficient routing scheme for a limited number of aeromedical aircraft for a ninety day war scenario. The requirement to transport large numbers of patients from nine hubs to forty-one distant airports with only thirty aircraft and the possibility of scarce fuel made route efficiency imperative. Although several vehicle routing heuristics exist, Clarke-Wright has long been one of the most basic and effective. The deterministic application of Clarke-Wright and split delivery heuristics created a daily routing structure, successfully allocated less than thirty aircraft across the hubs and indentified major shortfalls in bed availability.

Allocation of Aircraft

Table 6 from the previous chapter shows that the routing scheme needed at most twenty-four aircraft, and, on the average day, the system needed only fifteen aircraft. The simplest basing structure would have the worst-case number of aircraft permanently stationed at each hub. Unfortunately, such a concept may not be appropriate due to maintenance requirements and the impact of the two other medical evacuation missions discussed in Chapter one. Nevertheless, the research does demonstrate that thirty MD-80s are sufficient to transport 4500 patients each day, and that the PAC will have at least six spare aircraft.

Route Generation

The research expected to generate daily route structures with changes to the structure occuring only when beds in a particular category became unavailable. Since bed shortages occurred at predictable intervals, the routes should have also been predictable. Such routes would have made development of a wartime operations plan an easy task. Instead, the research discovered that the routes were extremely unpredictable. In some cases, a change in the daily patient load of just one patient forced an entirely new route structure. In a realistic situation where the number of incoming patients may greatly vary far from 4500, the actual routes will not even remotely resemble those

presented in Appendices E through M. Since the routes are unpredictable and unstable, MAC should not incorporate them into an operations plan. MAC could, however, make some use of the day one routes for worst-case planning.

The routes would also prove useless to schedulers at the Patient Airlift Center. Two alternatives exist to help perform daily scheduling and will be fully discussed later in this chapter.

Shortage Identification

The research discovered that available hospital beds comprised the only shortage in the airlift system. Table 8 of Chapter four shows a shortage of surgical, orthopedic and burn injury beds. The beds fill and empty at predictable rates depending on the number of patients and their recovery rates. Although there are a large number of surgical beds in the system, the numbers of patients in this category exhaust the available beds by day eighteen. Due to a recovery rate of twenty-nine days, the beds do not become available again until day twenty- nine. Over a ninety-day period these beds are available for sixty days. The system has an even greater problem with orthopedic beds as every network fills to capacity by day seven. Since these patients do not recover for fifty days, these beds are available for new patients only fourteen days. Finally, each network fills its burn patient beds by day fifteen. The beds do not begin emptying until day thirty-eight. Throughout

the ninety-day period, these beds are available for only thirty days.

The shortages are obviously an important indication to MAC that more beds are necessary. The shortages also drive the route structure. As can be seen from Table 5 in the previous chapter, bed shortages reduce the number of aircraft needed to four or fewer on several occasions. In several networks, no aircraft are needed for up to twenty-three days. If the system had sufficient beds to accomodate 4500 patients each day, every route would look similar to those on day one with a few minor exceptions. In this case, the routes generated by this research would have been suitable for an operations plan.

To summarize the research results for the three objectives, optimizing the routes has demonstrated that less than thiry aircraft, twenty-four to be exact, can successfully transport 4500 patients each day. With the current number of beds available, and given that the actual patient load will be 4500 each day, even fewer aircraft are necessary for eighty-four days. The routes for these aircraft are extremely sensitive to changes in the patient load. In many instances, an addition or deletion of a single patient to a certain day's patient load changed the route structure dramatically. Since this will be quite common in an actual conflict, MAC will need some type of

scheduling aid to plan daily operations. Finally, the current system does not have enough beds to accomodate surgical, orthopedic or burn patients. MAC is no doubt aware of the shortfall already and hopefully will work to correct it.

Validation Analysis

Comparison to Carter's Thesis.

A comparison of this research to Carter's thesis provides a general test of consistency of both deterministic and probabilistic approaches. Since both approaches could be invalid, any agreement in results does not completely validate either method; however, agreement certainly establishes credibility for both research efforts. In fact, the successful comparison of deterministic and probabilistic heuristics can indicate validity of the deterministic model (18:80).

The results listed in Table 9 of Chapter four show quite clearly that total block hours of each network and the system as a whole agree very closely. The largest disagreement is nearly twelve percent, with two networks, Philadelphia and Chicago, reporting only a two percent or less disagreement. It is important to note that these two networks rank one and two respectively in the number of patients transported. The largest disagreements occur at networks with much lower patient loads. This could be due

to the difference in assignment of spinal cord patients. In any event, even the smallest networks show fairly good agreement. Since the sum of the total network route times differ by slightly less than five percent, which is well within the twenty five percent, worst-case bound required by Merrill, the two solutions are essentially equivalent and consistent.

<u>Comparison to a Mathematical Formulation.</u>

Formulation of a math program for this problem offers a possibility for future research. Unfortunately, this research did not develop such a formulation. The fact that a heuristic has been combined with a math program does not make the solution unreliable. In many pratical problems, heuristics serve to adjust solutions obtained from optimization models or to save computation time (19:142). In this study, two heuristics remain unvalidated. The first allows individual round trip flights to single airports which expect more than forty-eight patients, and the second allows split deliveries to airports which expect less than forty-eight patients. Both heuristics make a practical problem solvable, and both are intuitively valid.

Even the traditional Clarke-Wright portion of the heuristic model cannot be validated by formulation, because the vehicle fleet size variable was predetermined by the heuristic model for input into the math program. Any future formulations would require the ability to solve for this

variable. Until a formulation becomes available, this research cannot be completely validated. Instead the research must rely on the intuitive and historical proof of the heuristic model and on the comparison with Carter's thesis.

III. Summary

This research used a deterministic, "brute force" technique to solve a vehicle routing problem. Such a technique has advantages and disadvantages, some of which will be discussed below. The summary also discusses future research possibilities arising from this problem.

The deterministic approach provides exact information about aircraft allocation, route structures and bed shortages for each network on each day of the ninety day period. The detailed nature of the results consititutes the primary nature of this approach. Secondly, this approach produces a worst-case result, which military planners usually need to know. A final advantage of this approach is its simplicity. Although the research contains numerous calculations, all are computationally simple. The heuristics do not require an extensive mathematical background to understand or implement, and one, the Clarke-Wright heuristic, has proven reliable in the past.

Unfortunately, several disadvantages also exist. First

the approach requires a fairly complex computer program to efficiently determine daily patient loads and to perform both heuristics. The program proved too complex, forcing this research to resort to hand calculations. As can be seen from the large appendices, this method was rigid and tremendously tedious. Errors were likely and difficult to correct. A second disadvantage, already discussed in previous chapters, is the highly variable nature of the resulting routes. MAC planners will probably find the worst-case routes from day one as the only useful ingredient for an operations plan.

To summarize the advantages and disadvantages, this research produced four findings. First, thirty aircraft can accomodate the worst case patient loads. Secondly, route structures, if determined by a Clarke-Wright heuristic or similar variant, will be extremely volatile and unpredictable. Third, the current number of available beds is definitely inadequate, and finally, the resulting route times from this approach agree with those determined by a stochastic approach. The stochastic approach adopted by Carter is more complex than the deterministic approach but does produce an average route, which is more suitable for an operations plan. MAC planners could conceivably adopt both the average routes, determined by stochastic methods, and the worst-case routes, determined by deterministic methods, in a future operations plan. The deterministic approach

does offer a major advantage over the stochastic approach in that the former can determine the optimal number of required aircraft within the heuristic structure. Carter's approach requires a "guess" at the proper number of aircraft before beginning the space filling curve heuristic.

This problem offers many possibilities for future study. From a technique standpoint, researchers could compare other techniques such as set partitioning or Lagrangian relaxation with the savings-insertion approach of this thesis. Perhaps the most interesting research would explore scheduling aspects of this problem. These receive special attention below.

This research simply determines the route structures during a twenty-four hour period but makes no attempt to schedule departure and arrival times. A requirement to do so would transform the routing problem into a scheduling problem. Such a problem would have to consider deconfliction of flight times, aircrews and maintenance services. The problem would increase in scope to encompass the entire areomedical operation. Several heuristics exist for aircraft, crew and maintenance scheduling.

A second area of research concerns the conflict between optimization of aircraft operation time and patient transit time. At first glance, these objectives may seem similar but in actuality, they are not. For example, a common route

in the Chicago network is Chicago to Detroit, Detroit to Cleveland, Cleveland to Wright-Patterson AFB and then back to Chicago. The Clarke-Wright algorithm constructs a route which must visit Cleveland after either Detroit or Wright-Patterson AFB. In this case it does not matter which airport, Detroit or Wright-Patterson AFB is visited first, as long as Cleveland is second. Now assume Detroit expects three patients, Cleveland expects twelve and Wright-Patterson expects five. If another objective of the research is to minimize patient transit time, then the less restrictive Clarke-Wright solution is not valid. In fact, patient travel time may best be served by an initial visit to Cleveland. Teodorovic, Kikuchi and Hohlacov have authored an article which formulates this multi-objective problem. The authors also offer a heuristic based on an extension of Clarke-Wright (20:15).

Two additional research extensions offer promise for building daily route structures. The first is an expert system based on knowledge gained from this research. After several iterations of the heuristic model, a pattern developed in each network, which allowed generation of routes by simple inspection of the patient loads. These patterns allow determination of the optimal route structure without actually performing every Clarke-Wright calculation. If this thought process can be captured and written as decision rules, an expert system can generate the optimal

routes. A prototype system for the Denver network is located in Appendix P. Such a system has two drawbacks. First, as the number of distant airports increase, pattern recognition becomes less reliable, and heuristic calculations become more necessary. Secondly, the system is extremely rigid. As long as the networks do not change, the expert system remains valid. If, however, another airport is added to a network, the decision rules will require reconstruction. A second decision aid offers more flexibility and less uncertainty.

A computer code could not only make accurate heuristic calculations, but could also be modified to include additional airports as well. Originally, this research intended to create such a program, but the coding proved too difficult.

In summary, this research demonstrates that thirty aircraft are sufficient to transport the worst-case patient loads. The research also provides worst-case route structures and the total time required to fly these structures. Finally, the research identifies shortfalls in bed availability. Future extensions to this research should include route, crew and maintenance scheduling, patient time versus aircraft time optimization and finally, decision aids for daily route generation or scheduling.

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Appendix A: ICAO Codes for Network Airports

Airport	ICAO
Los Angeles	KLAX
Tucson	KDMA
Luke AFB	KLUF
San Francisco	KSFO
Portland	KPDX
Ft Lewis	KGRF
Boston	KBOS
Albany	KALB
Charlotte	KCLT
Ft Gordon	KAGS
Charleston	KCHS
Denver	KBKF
Albuquerque	KABQ
Ft Bliss	KBIF
Hill AFB	KHIF
Wichita	KIAB
Philadelphia	KPHL
Buffalo	KBUF
Norfolk	KORF
Pittsburgh	KPIT
Syracuse	KSYR
Washington D.C.	KADW
Houston	KEFD
Carswell AFB	KFWH
Little Rock AFB	KLRF
New Orleans	KMSY
Oklahoma City	KOKC
San Antonio	KSKF
Shreveport	KBAD
Atlanta	KATL
Birmingham	KBHM
Homestead AFB	KHST
Jackson	KJAN
Jacksonville	KJAX
Knoxville	KTSY
Nashville	KBNA

Airport	ICAO
Millington	KNQA
Orlando	KMCO
Chicago	KORD
Allen Park	KDTW
Cleveland	KCLE
Des Moines	KDSM
Ft Leavenworth	KMCI
Indianapolis	KIND
Lexington	KLEX
Minneapolis	KMSP
Offut AFB	KOFF
Scott AFB	KBLV
Wright-Patterson AFB	KFFO

Appendix B: Hub/Airport Distance Matrices

HUB: Los Angeles

	KLAX	KLUF	KDMA
KLAX	-	373	486
KLUF	373	-	126
KDMA	486	126	-

HUB: San Francisco

	KSFO	KPDX	KGRF
KSFO	-	479	569
KPDX	479	-	90
KGRF	569	90	-

HUB: Boston

	KBOS	KALB
KBOS	-	166
KALB	166	-

HUB: Charlotte

	KCLT	KAGS	KCHS
KCLT	-	127	149
KAGS	127	-	119
KCHS	149	119	-

HUB: Denver

	KBKF	KABQ	KHIF	KIAB	KBIF
KBKF	-	280	341	364	464
KABQ	280	-	439	467	191
KHIF	341	439	-	705	607
KIAB	364	467	705	-	563
KBIF	464	191	607	563	-

HUB: Philadelphia

	KPHL	KADW	KORF	KSYR	KBUF	KPIT
KPHL	-	113	188	201	279	302
KADW	113	-	98	279	299	253
KORF	188	98	-	373	394	324
KSYR	201	279	373	-	158	294
KBUF	279	299	394	158	-	172
KPIT	302	253	324	294	172	-

HUB: Houston

	KEFD	KSKF	KBAD	KFWH	KMSY	KLRF	KOKC
KEFD	-	196	204	227	293	360	376
KSKF	196	-	350	205	488	494	368
KBAD	204	350	-	232	234	156	291
KFWH	227	205	232	-	446	335	168
KMSY	293	488	234	446	-	295	525
KLRF	360	494	156	335	295	-	312
KOKC	376	368	291	168	525	312	-

HUB: Atlanta

	ATL	BHM	HST	JAN	JAX	TSY	NQA	BNA	MCO
KATL	-	140	561	349	250	133	343	202	364
KBHM	140	-	633	213	356	214	216	154	449
KHST	561	633	-	726	324	671	837	757	199
KJAN	349	213	726	-	515	422	183	307	575
KJAX	250	356	324	515	-	348	571	452	126
KTSY	133	214	671	422	348	-	354	163	472
KNQA	343	216	837	183	571	354	-	197	661
KBNA	202	154	757	307	452	163	197	-	564
KMCO	364	449	199	575	126	472	661	564	-

HUB: Chicago

	ORD	IND	BLV	DTW	FFO	LEX	DMS	MSP	CLE	MCI	OFF
KORD	-	167	240	274	276	309	347	363	365	440	462
KIND	167	-	211	231	136	143	456	519	285	508	562
KBLV	240	211	-	438	337	295	315	452	496	319	398
KDTW	274	231	438	-	168	262	621	614	102	705	736
KFFO	276	136	337	168	-	94	591	640	174	642	698
KLEX	309	143	295	262	94	-	583	661	262	612	682

	ORD	IND	BLV	DTW	FFO	LEX	DMS	MSP	CLE	MCI	OFF
KDMS	347	456	315	621	591	583	-	203	709	149	117
KMSP	363	519	452	614	640	661	203	-	714	348	268
KCLE	365	285	496	102	174	262	709	714	-	784	823
KMCI	440	508	319	705	642	612	149	348	784	-	117
KOFF	462	562	398	736	698	682	117	268	823	117	-

Appendix C: Hospital Capacities in Airport Areas

	Category					
Airport	MM	MP	SS	SO	SC	SB
Los Angeles	4704	1343	3327	1102	567	473
Tucson	169	66	82	35	9	8
Luke AFB	371	110	472	47	21	5
San Francisco	897	421	1481	358	117	56
Ft Lewis	473	180	450	264	81	77
Portland	213	64	327	81	15	12
Boston	3593	303	2612	368	97	55
Northampton	233	6	132	66	4	5
Albany	180	104	181	103	1	1
Charlotte	527	344	370	102	41	14
Ft. Jackson	420	110	242	149	24	27
Ft. Gordon	274	212	169	150	29	14
Ft. Bragg	1621	533	1632	714	142	135
Charleston	212	78	277	62	3	12
Denver	603	190	732	437	26	3
Hill AFB	171	72	186	32	20	17
Wichita	52	30	46	42	0	1
Albuquerque	118	27	123	36	0	5
Ft. Bliss	603	115	539	389	27	3
Philadelphia	4209	1286	3367	784	228	102
Syracuse	219	31	47	16	4	38
Buffalo	813	128	671	202	25	17
Pittsburgh	1366	110	946	134	30	10
Norfolk	1201	516	1061	434	22	46
Wash D.C.	1604	357	1403	711	170	23
Houston	1211	246	1205	402	5	26
New Orleans	2323	635	1271	325	79	23
Little Rock	80	10	83	86	0	0
Shreveport	229	101	106	32	0	4
Oklahoma City	227	52	422	120	1	0
Carswell AFB	683	147	502	174	52	0
San Antonio	1150	291	428	138	9	35

Airport	MM	MP	SS	SO	SC	SB
Atlanta	706	84	467	309	3	35
Homestead	60	27	82	0	3	0
Birmingham	514	71	487	56	12	9
Orlando	875	154	702	201	57	50
Jacksonville	456	193	393	355	54	57
Jackson	336	166	315	23	16	8
Millington	427	160	248	59	25	4
Knoxville	206	57	209	64	9	1
Nashville	468	199	490	161	13	5
Chicago	2204	568	2651	547	88	95
Cleveland	344	197	287	103	41	33
Minneapolis	88	149	338	73	27	11
Des Moines	65	27	84	12	4	3
Indianapolis	250	77	84	33	8	3
Scott AFB	665	130	1216	276	0	0
Leavenworth	222	76	382	84	24	6
Lexington	261	92	395	192	5	1
Allen Park	592	154	514	130	29	26
Offut AFB	583	104	126	178	14	16
Wright-Patt	537	155	880	318	120	96

Key: MM = General Medical
MP = Psychological
SS = Surgical Medical
SO = Orthopedic
SC = Spinal Injury
SB = Burn Injury

Appendix D: Patient Distribution by Percentages

Los Angeles Network

	MM	MP	SS	SO	SC	SB
% of total beds	.129	.137	.110	.105	.250	.285
x						
# of patients	567	144	1985	1656	31	117
Total	73	20	218	174	8	33

San Francisco Network

	MM	MP	SS	SO	SC	SB
% of total beds	.039	.060	.064	.062	.089	.085
x						
# of patients	567	144	1985	1656	31	117
Total	22	9	127	103	3	10

Boston Network

	MM	MP	SS	SO	SC	SB
% of total beds	.099	.037	.083	.048	.043	.036
x						
# of patients	567	144	1985	1656	31	117
Total	56	5	165	79	1	4

Charlotte Network

	MM	MP	SS	SO	SC	SB
% of total beds	.075	.115	.076	.104	.100	.118
x						
# of patients	567	144	1985	1656	31	117
Total	43	17	151	172	3	14

Denver Network

	MM	MP	SS	SO	SC	SB
% of total beds	.038	.039	.046	.083	.031	.016
x						
# of patients	567	144	1985	1656	31	117
Total	22	6	91	137	1	2

Philadelphia Network

	MM	MP	SS	SO	SC	SB
% of total beds	.232	.220	.213	.202	.200	.138
x						
# of patients	567	144	1985	1656	31	117
Total	132	32	423	335	6	16

Houston Network

	MM	MP	SS	SO	SC	SB
% of total beds	.145	.143	.114	.113	.061	.052
x						
# of patients	567	144	1985	1656	31	117
Total	82	19	226	187	2	6

Atlanta Network

	MM	MP	SS	SO	SC	SB
% of total beds	.100	.100	.096	.109	.080	.099
x						
# of patients	567	144	1985	1656	31	117
Total	57	14	191	181	2	12

Chicago Network

	MM	MP	SS	SO	SC	SB
% of total beds x	.143	.156	.197	.173	.150	.170
# of patients	567	144	1985	1656	31	117
Total	80	22	393	288	5	20

Appendix E: Routing Calculations for the Los Angeles Network

Ninety Day Patient Delivery Schedules

Airport: Luke AFB

Day	Category 1	2	3	4	5	6	Tot
1	0	0	27	7	0	0	34
2	0	0	27	7	0	0	34
3	0	0	27	7	0	0	34
4	0	0	27	7	0	0	34
5	0	0	27	7	0	0	34
6	0	0	27	7	0	0	34
7	0	0	27	5	0	0	32
8	0	0	27	0	0	0	27
9	0	0	27	0	0	0	27
10	0	0	27	0	0	0	27
11	0	0	27	0	0	0	27
12	0	0	27	0	0	0	27
13	0	0	27	0	0	0	27
14	0	0	27	0	0	0	27
15	0	0	27	0	0	5	32
16	0	0	27	0	0	0	27
17	0	0	27	0	0	0	27
18	0	0	13	0	0	0	13
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	27	0	0	0	27
30	0	0	27	0	0	0	27
31	0	0	27	0	0	0	27
32	0	0	27	0	0	0	27
33	0	0	27	0	0	0	27
34	0	0	27	0	0	0	27
35	0	0	27	0	0	0	27
36	0	0	27	0	0	0	27
37	0	0	27	0	0	0	27
38	0	0	27	0	0	0	27
39	0	0	27	0	0	0	27
40	0	0	27	0	0	0	27
41	0	0	27	0	0	0	27
42	0	0	27	0	0	0	27

43	0	0	27	0	0	0	27
44	0	0	27	0	0	0	27
45	0	0	27	0	0	0	27
46	0	0	13	0	0	0	13
47	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	7	0	0	7
51	0	0	0	7	0	0	7
52	0	0	0	7	0	5	12
53	0	0	0	7	0	0	7
54	0	0	0	7	0	0	7
55	0	0	0	7	0	0	7
56	0	0	0	5	0	0	5
57	0	0	27	0	0	0	27
58	0	0	27	0	0	0	27
59	0	0	27	0	0	0	27
60	0	0	27	0	0	0	27
61	0	0	27	0	0	0	27
62	0	0	27	0	0	0	27
63	0	0	27	0	0	0	27
64	0	0	27	0	0	0	27
65	0	0	27	0	0	0	27
66	0	0	27	0	0	0	27
67	0	0	27	0	0	0	27
68	0	0	27	0	0	0	27
69	0	0	27	0	0	0	27
70	0	0	27	0	0	0	27
71	0	0	27	0	0	0	27
72	0	0	27	0	0	0	27
73	0	0	27	0	0	0	27
74	0	0	13	0	0	0	13
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	27	0	0	0	27
86	0	0	27	0	0	0	27
87	0	0	27	0	0	0	27
88	0	0	27	0	0	0	27
89	0	0	27	0	0	5	32
90	0	0	27	0	0	0	27

Airport: Tucson

Day	Category 1	2	3	4	5	6	Total
1	0	0	5	5	0	0	10
2	0	0	5	5	0	0	10
3	0	0	5	5	0	0	10
4	0	0	5	5	0	0	10
5	0	0	5	5	0	0	10
6	0	0	5	5	0	0	10
7	0	0	5	5	0	0	10
8	0	0	5	0	0	0	5
9	0	0	5	0	0	0	5
10	0	0	5	0	0	0	5
11	0	0	5	0	0	0	5
12	0	0	5	0	0	0	5
13	0	0	5	0	0	0	5
14	0	0	5	0	0	0	5
15	0	0	5	0	0	8	13
16	0	0	5	0	0	0	5
17	0	0	2	0	0	0	2
18	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	5	0	0	0	5
30	0	0	5	0	0	0	5
31	0	0	5	0	0	0	5
32	0	0	5	0	0	0	5
33	0	0	5	0	0	0	5
34	0	0	5	0	0	0	5
35	0	0	5	0	0	0	5
36	0	0	5	0	0	0	5
37	0	0	5	0	0	0	5
38	0	0	5	0	0	0	5
39	0	0	5	0	0	0	5
40	0	0	5	0	0	0	5
41	0	0	5	0	0	0	5
42	0	0	5	0	0	0	5
43	0	0	5	0	0	0	5
44	0	0	5	0	0	0	5
45	0	0	2	0	0	0	2
46	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0

48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	5	0	0	5
51	0	0	0	5	0	0	5
52	0	0	0	5	0	8	13
53	0	0	0	5	0	0	5
54	0	0	0	5	0	0	5
55	0	0	0	5	0	0	5
56	0	0	0	5	0	0	5
57	0	0	5	0	0	0	5
58	0	0	5	0	0	0	5
59	0	0	5	0	0	0	5
60	0	0	5	0	0	0	5
61	0	0	5	0	0	0	5
62	0	0	5	0	0	0	5
63	0	0	5	0	0	0	5
64	0	0	5	0	0	0	5
65	0	0	5	0	0	0	5
66	0	0	5	0	0	0	5
67	0	0	5	0	0	0	5
68	0	0	5	0	0	0	5
69	0	0	5	0	0	0	5
70	0	0	5	0	0	0	5
71	0	0	5	0	0	0	5
72	0	0	5	0	0	0	5
73	0	0	2	0	0	0	2
74	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	5	0	0	0	5
86	0	0	5	0	0	0	5
87	0	0	5	0	0	0	5
88	0	0	5	0	0	0	5
89	0	0	5	0	0	8	13
90	0	0	5	0	0	0	5

Heuristic Calculations

Applicable Days: 1-17, 29-45, 50-73, 85-90

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KLAX-KLUF-KLAX	>0	0	3.49	-	
KLAX-KDMA-KLAX	>0	0	4.24	-	
KLAX-KLUF-KDMA -KLAX	>0	0	5.28	2.45	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KLAX-KLUF-KDMA-KLAX

Total Time: 5.28
Aircraft Required: 1

Applicable Days: 18,46,74

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KLAX-KLUF-KLAX	>0	0	3.49	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KLAX-KLUF-KLAX

Total Time: 3.49
Aircraft Required: 1

Applicable Days: 19-28, 47-49, 75-84

No Routes or Aircraft Required

Appendix F: Routing Calculations for the San Francisco Network

Ninety Day Patient Delivery Schedules

Airport: Portland

Day \ Category	1	2	3	4	5	6	Tot
1	0	0	18	12	0	0	30
2	0	0	18	12	0	0	30
3	0	0	18	12	0	0	30
4	0	0	18	12	0	0	30
5	0	0	18	12	0	0	30
6	0	0	18	12	0	0	30
7	0	0	18	9	0	0	27
8	0	0	18	0	0	0	18
9	0	0	18	0	0	0	18
10	0	0	18	0	0	0	18
11	0	0	18	0	0	0	18
12	0	0	18	0	0	0	18
13	0	0	18	0	0	0	18
14	0	0	18	0	0	7	25
15	0	0	18	0	0	5	23
16	0	0	18	0	0	0	18
17	0	0	18	0	0	0	18
18	0	0	21	0	0	0	21
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	18	0	0	0	18
30	0	0	18	0	0	0	18
31	0	0	18	0	0	0	18
32	0	0	18	0	0	0	18
33	0	0	18	0	0	0	18
34	0	0	18	0	0	0	18
35	0	0	18	0	0	0	18
36	0	0	18	0	0	0	18
37	0	0	18	0	0	0	18
38	0	0	18	0	0	0	18
39	0	0	18	0	0	0	18
40	0	0	18	0	0	0	18
41	0	0	18	0	0	0	18

42	0	0	18	0	0	0	18
43	0	0	18	0	0	0	18
44	0	0	18	0	0	0	18
45	0	0	18	0	0	0	18
46	0	0	21	0	0	0	21
47	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	12	0	0	12
51	0	0	0	12	0	7	19
52	0	0	0	12	0	5	17
53	0	0	0	12	0	0	12
54	0	0	0	12	0	0	12
55	0	0	0	12	0	0	12
56	0	0	0	9	0	0	9
57	0	0	18	0	0	0	18
58	0	0	18	0	0	0	18
59	0	0	18	0	0	0	18
60	0	0	18	0	0	0	18
61	0	0	18	0	0	0	18
62	0	0	18	0	0	0	18
63	0	0	18	0	0	0	18
64	0	0	18	0	0	0	18
65	0	0	18	0	0	0	18
66	0	0	18	0	0	0	18
67	0	0	18	0	0	0	18
68	0	0	18	0	0	0	18
69	0	0	18	0	0	0	18
70	0	0	18	0	0	0	18
71	0	0	18	0	0	0	18
72	0	0	18	0	0	0	18
73	0	0	18	0	0	0	18
74	0	0	21	0	0	0	21
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	18	0	0	0	18
86	0	0	18	0	0	0	18
87	0	0	18	0	0	0	18
88	0	0	18	0	0	7	25
89	0	0	18	0	0	5	23
90	0	0	18	0	0	0	18

Airport: Ft Lewis

Day	Category 1	2	3	4	5	6	Tot
1	0	0	26	39	0	0	65
2	0	0	26	39	0	0	65
3	0	0	26	39	0	0	65
4	0	0	26	39	0	0	65
5	0	0	26	39	0	0	65
6	0	0	26	39	0	4	69
7	0	0	26	30	0	10	66
8	0	0	26	0	0	10	36
9	0	0	26	0	0	10	36
10	0	0	26	0	0	10	36
11	0	0	26	0	0	10	36
12	0	0	26	0	0	10	36
13	0	0	26	0	0	10	36
14	0	0	26	0	0	3	29
15	0	0	26	0	0	3	29
16	0	0	26	0	0	0	26
17	0	0	26	0	0	0	26
18	0	0	8	0	0	0	8
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	26	0	0	0	26
30	0	0	26	0	0	0	26
31	0	0	26	0	0	0	26
32	0	0	26	0	0	0	26
33	0	0	26	0	0	0	26
34	0	0	26	0	0	0	26
35	0	0	26	0	0	0	26
36	0	0	26	0	0	0	26
37	0	0	26	0	0	0	26
38	0	0	26	0	0	0	26
39	0	0	26	0	0	0	26
40	0	0	26	0	0	0	26
41	0	0	26	0	0	0	26
42	0	0	26	0	0	0	26
43	0	0	26	0	0	4	30
44	0	0	26	0	0	10	36
45	0	0	26	0	0	10	36
46	0	0	8	0	0	10	18
47	0	0	0	0	0	10	10

48	0	0	0	0	0	10	10
49	0	0	0	0	0	10	10
50	0	0	0	39	0	10	49
51	0	0	0	39	0	3	42
52	0	0	0	39	0	3	42
53	0	0	0	39	0	0	39
54	0	0	0	39	0	0	39
55	0	0	0	39	0	0	39
56	0	0	0	30	0	0	30
57	0	0	26	0	0	0	26
58	0	0	26	0	0	0	26
59	0	0	26	0	0	0	26
60	0	0	26	0	0	0	26
61	0	0	26	0	0	0	26
62	0	0	26	0	0	0	26
63	0	0	26	0	0	0	26
64	0	0	26	0	0	0	26
65	0	0	26	0	0	0	26
66	0	0	26	0	0	0	26
67	0	0	26	0	0	0	26
68	0	0	26	0	0	0	26
69	0	0	26	0	0	0	26
70	0	0	26	0	0	0	26
71	0	0	26	0	0	0	26
72	0	0	26	0	0	0	26
73	0	0	26	0	0	0	26
74	0	0	8	0	0	0	8
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	4	4
81	0	0	0	0	0	10	10
82	0	0	0	0	0	10	10
83	0	0	0	0	0	10	10
84	0	0	0	0	0	10	10
85	0	0	26	0	0	10	36
86	0	0	26	0	0	10	36
87	0	0	26	0	0	10	36
88	0	0	26	0	0	3	29
89	0	0	26	0	0	0	26
90	0	0	26	0	0	0	26

Heuristic Calculations

Applicable Days: 1-5, 7, 50

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KSFO-KPDX-KSFO	>0	0	4.19	-	
KSFO-KGRF-KSFO	0	>0	4.79	-	Feasible/Select
KSFO-KPDX-KSFO	>0	0	4.79	-	
KSFO-KPDX-KGRF -KSFO	>0	0	5.79	3.19	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KSFO-KGRF-KSFO
KSFO-KPDX-KGRF-KSFO

Total Time: 10.58
Aircraft Required: 2

Applicable Days: 6

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KSFO-KPDX-KSFO	>0	0	4.19	-	
KSFO-KGRF-KSFO	0	>0	4.79	-	Feasible/Select
KSFO-KPDX-KSFO	>0	0	4.79	-	
KSFO-KPDX-KGRF -KSFO	0	>0	5.79	3.19	
KSFO-KPDX-KSFO	>0	0	4.19	-	Feasible/Select
KSFO-KGRF-KSFO	>0	0	4.79	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KSFO-KPDX-KSFO
KSFO-KGRF-KSFO
KSFO-KGRF-KSFO

Total Time: 13.77
Aircraft Required: 2

Applicable Days: 8-15, 44-45, 51-55, 85-90

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KSFO-KPDX-KSFO	>0	0	4.19	-	
KSFO-KGRF-KSFO	>0	0	4.79	-	
KSFO-KPDX-KGRF -KSFO	0	>0	5.79	3.19	
KSFO-KPDX-KSFO	>0	0	4.19	-	Feasible/Select
KSFO-KGRF-KSFO	>0	0	4.79	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KSFO-KPDX-KSFO
KSFO-KGRF-KSFO

Total Time: 8.98
Aircraft Required: 1

Applicable Days: 16-18, 29-43, 46, 56-74

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KSFO-KPDX-KSFO	>0	0	4.19	-	
KSFO-KGRF-KSFO	>0	0	4.79	-	
KSFO-KPDX-KGRF -KSFO	>0	0	5.79	3.19	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KSFO-KGRF-KPDX-KSFO

Total Time: 5.79
Aircraft Required: 1

Applicable Days: 47-49, 80-84

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KSFO-KGRF-KSFO	>0	0	4.79	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KSFO-KGRF-KSFO

Total Time: 4.79
Aircraft Required: 1

Applicable Days: 19-28, 74-79

No Routes or Aircraft Required

Appendix G: Routing Calculations for the Boston Network

Ninety Day Patient Delivery Schedules

Airport: Albany

Day	Category 1	2	3	4	5	6	Tot
1	0	0	11	15	0	0	26
2	0	0	11	15	0	0	26
3	0	0	11	15	0	0	26
4	0	0	11	15	0	0	26
5	0	0	11	15	0	0	26
6	0	0	11	15	0	0	26
7	0	0	11	13	0	0	24
8	0	0	11	0	0	0	11
9	0	0	11	0	0	0	11
10	0	0	11	0	0	0	11
11	0	0	11	0	0	0	11
12	0	0	11	0	0	0	11
13	0	0	11	0	0	0	11
14	0	0	11	0	0	1	12
15	0	0	11	0	0	0	11
16	0	0	11	0	0	0	11
17	0	0	5	0	0	0	5
18	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	11	0	0	0	11
30	0	0	11	0	0	0	11
31	0	0	11	0	0	0	11
32	0	0	11	0	0	0	11
33	0	0	11	0	0	0	11
34	0	0	11	0	0	0	11
35	0	0	11	0	0	0	11
36	0	0	11	0	0	0	11
37	0	0	11	0	0	0	11
38	0	0	11	0	0	0	11
39	0	0	11	0	0	0	11
40	0	0	11	0	0	0	11

41	0	0	11	0	0	0	11
42	0	0	11	0	0	0	11
43	0	0	11	0	0	0	11
44	0	0	11	0	0	0	11
45	0	0	5	0	0	0	5
46	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	15	0	0	15
51	0	0	0	15	0	1	16
52	0	0	0	15	0	0	15
53	0	0	0	15	0	0	15
54	0	0	0	15	0	0	15
55	0	0	0	15	0	0	15
56	0	0	0	13	0	0	13
57	0	0	11	0	0	0	11
58	0	0	11	0	0	0	11
59	0	0	11	0	0	0	11
60	0	0	11	0	0	0	11
61	0	0	11	0	0	0	11
62	0	0	11	0	0	0	11
63	0	0	11	0	0	0	11
64	0	0	11	0	0	0	11
65	0	0	11	0	0	0	11
66	0	0	11	0	0	0	11
67	0	0	11	0	0	0	11
68	0	0	11	0	0	0	11
69	0	0	11	0	0	0	11
70	0	0	11	0	0	0	11
71	0	0	11	0	0	0	11
72	0	0	11	0	0	0	11
73	0	0	5	0	0	0	5
74	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	11	0	0	0	11
86	0	0	11	0	0	0	11
87	0	0	11	0	0	0	11
88	0	0	11	0	0	1	12
89	0	0	11	0	0	0	11
90	0	0	11	0	0	0	11

Heuristic Calculations

Applicable Days: 1-17, 29-45, 50-73, 85-90

** No Calculations are Necessary **

Selected Routes

KBOS-KALB-KBOS

Total Time: 2.11
Aircraft Required: 1

Applicable Days: 18-28, 46-49, 74-84

No Routes or Aircraft Required

Appendix H: Routing Calculations for the Charlotte Network

Ninety Day Patient Delivery Schedule

Airport: Ft Gordon

Day \ Category	1	2	3	4	5	6	Tot
1	0	0	10	22	0	0	32
2	0	0	10	22	0	0	32
3	0	0	10	22	0	0	32
4	0	0	10	22	0	0	32
5	0	0	10	22	0	0	32
6	0	0	10	22	0	0	32
7	0	0	10	18	0	0	28
8	0	0	10	0	0	0	10
9	0	0	10	0	0	0	10
10	0	0	10	0	0	0	10
11	0	0	10	0	0	0	10
12	0	0	10	0	0	0	10
13	0	0	10	0	0	6	16
14	0	0	10	0	0	8	18
15	0	0	10	0	0	0	10
16	0	0	10	0	0	0	10
17	0	0	9	0	0	0	9
18	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	10	0	0	0	10
30	0	0	10	0	0	0	10
31	0	0	10	0	0	0	10
32	0	0	10	0	0	0	10
33	0	0	10	0	0	0	10
34	0	0	10	0	0	0	10
35	0	0	10	0	0	0	10
36	0	0	10	0	0	0	10
37	0	0	10	0	0	0	10
38	0	0	10	0	0	0	10
39	0	0	10	0	0	0	10
40	0	0	10	0	0	0	10

41	0	0	10	0	0	0	10
42	0	0	10	0	0	0	10
43	0	0	10	0	0	0	10
44	0	0	10	0	0	0	10
45	0	0	9	0	0	0	9
46	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	22	0	6	28
51	0	0	0	22	0	8	30
52	0	0	0	22	0	0	22
53	0	0	0	22	0	0	22
54	0	0	0	22	0	0	22
55	0	0	0	22	0	0	22
56	0	0	0	18	0	0	18
57	0	0	10	0	0	0	10
58	0	0	10	0	0	0	10
59	0	0	10	0	0	0	10
60	0	0	10	0	0	0	10
61	0	0	10	0	0	0	10
62	0	0	10	0	0	0	10
63	0	0	10	0	0	0	10
64	0	0	10	0	0	0	10
65	0	0	10	0	0	0	10
66	0	0	10	0	0	0	10
67	0	0	10	0	0	0	10
68	0	0	10	0	0	0	10
69	0	0	10	0	0	0	10
70	0	0	10	0	0	0	10
71	0	0	10	0	0	0	10
72	0	0	10	0	0	0	10
73	0	0	9	0	0	0	9
74	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	10	0	0	0	10
86	0	0	10	0	0	0	10
87	0	0	10	0	0	6	16
88	0	0	10	0	0	8	18
89	0	0	10	0	0	0	10
90	0	0	10	0	0	0	10

Airport: Charleston

Day	Category 1	2	3	4	5	6	Tot
1	0	0	15	9	0	0	24
2	0	0	15	9	0	0	24
3	0	0	15	9	0	0	24
4	0	0	15	9	0	0	24
5	0	0	15	9	0	0	24
6	0	0	15	9	0	0	24
7	0	0	15	8	0	0	23
8	0	0	15	0	0	0	15
9	0	0	15	0	0	0	15
10	0	0	15	0	0	0	15
11	0	0	15	0	0	0	15
12	0	0	15	0	0	0	15
13	0	0	15	0	0	0	15
14	0	0	15	0	0	6	21
15	0	0	15	0	0	6	21
16	0	0	15	0	0	0	15
17	0	0	15	0	0	0	15
18	0	0	8	0	0	0	8
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	15	0	0	0	15
30	0	0	15	0	0	0	15
31	0	0	15	0	0	0	15
32	0	0	15	0	0	0	15
33	0	0	15	0	0	0	15
34	0	0	15	0	0	0	15
35	0	0	15	0	0	0	15
36	0	0	15	0	0	0	15
37	0	0	15	0	0	0	15
38	0	0	15	0	0	0	15
39	0	0	15	0	0	0	15
40	0	0	15	0	0	0	15
41	0	0	15	0	0	0	15
42	0	0	15	0	0	0	15
43	0	0	15	0	0	0	15
44	0	0	15	0	0	0	15
45	0	0	15	0	0	0	15
46	0	0	8	0	0	0	8
47	0	0	0	0	0	0	0

48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	9	0	0	9
51	0	0	0	9	0	6	15
52	0	0	0	9	0	6	15
53	0	0	0	9	0	0	9
54	0	0	0	9	0	0	9
55	0	0	0	9	0	0	9
56	0	0	0	8	0	0	8
57	0	0	15	0	0	0	15
58	0	0	15	0	0	0	15
59	0	0	15	0	0	0	15
60	0	0	15	0	0	0	15
61	0	0	15	0	0	0	15
62	0	0	15	0	0	0	15
63	0	0	15	0	0	0	15
64	0	0	15	0	0	0	15
65	0	0	15	0	0	0	15
66	0	0	15	0	0	0	15
67	0	0	15	0	0	0	15
68	0	0	15	0	0	0	15
69	0	0	15	0	0	0	15
70	0	0	15	0	0	0	15
71	0	0	15	0	0	0	15
72	0	0	15	0	0	0	15
73	0	0	15	0	0	0	15
74	0	0	8	0	0	0	8
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	15	0	0	0	15
86	0	0	15	0	0	0	15
87	0	0	15	0	0	0	15
88	0	0	15	0	0	6	21
89	0	0	15	0	0	6	21
90	0	0	15	0	0	0	15

Heuristic Calculations

Applicable Days: 1-7

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KCLT-KAGS-KCLT	>0	0	1.85	-	
KCLT-KCHS-KCLT	>0	0	1.99	-	
KCLT-KAGS-KCHS -KCLT	0	>0	3.32	.52	
KCLT-KAGS-KCLT	>0	0	1.85	-	Feasible/Select
KCLT-KCHS-KCLT	>0	0	1.99	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KCLT-KAGS-KCLT
KCLT-KCHS-KCLT

Total Time: 3.84
Aircraft Required: 1

Applicable Days: 8-17, 29-45, 50-73, 85-90

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KCLT-KAGS-KCLT	>0	0	1.85	-	
KCLT-KCHS-KCLT	>0	0	1.99	-	
KCLT-KAGS-KCHS -KCLT	>0	0	3.32	.52	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KCLT-KAGS-KCHS-KCLT

Total Time: 3.32
Aircraft Required: 1

Applicable Days: 18, 46, 74

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KCLT-KAGS-KCLT	>0	0	1.85	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KCLT-KAGS-KCLT

Total Time: 1.85
Aircraft Required: 1

Applicable Days: 19-28, 47-49, 75-84

No Routes or Aircraft Required

Appendix I: Routing Calculations for the Denver Network

Ninety Day Patient Delivery Schedules

Airport: Hill AFB

Day	Category 1	2	3	4	5	6	Tot
1	0	0	11	5	0	2	18
2	0	0	11	5	0	2	18
3	0	0	11	5	0	2	18
4	0	0	11	5	0	2	18
5	0	0	11	5	0	2	18
6	0	0	11	5	0	2	18
7	0	0	11	2	0	2	15
8	0	0	11	0	0	2	13
9	0	0	11	0	0	0	11
10	0	0	11	0	0	0	11
11	0	0	11	0	0	0	11
12	0	0	11	0	0	0	11
13	0	0	11	0	0	0	11
14	0	0	11	0	0	1	12
15	0	0	11	0	0	0	11
16	0	0	11	0	0	0	11
17	0	0	10	0	0	0	10
18	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	11	0	0	0	11
30	0	0	11	0	0	0	11
31	0	0	11	0	0	0	11
32	0	0	11	0	0	0	11
33	0	0	11	0	0	0	11
34	0	0	11	0	0	0	11
35	0	0	11	0	0	0	11
36	0	0	11	0	0	0	11
37	0	0	11	0	0	0	11
38	0	0	11	0	0	2	13
39	0	0	11	0	0	2	13
40	0	0	11	0	0	2	13

41	0	0	11	0	0	2	13
42	0	0	11	0	0	2	13
43	0	0	11	0	0	2	13
44	0	0	11	0	0	2	13
45	0	0	10	0	0	2	12
46	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	5	0	0	5
51	0	0	0	5	0	1	6
52	0	0	0	5	0	0	5
53	0	0	0	5	0	0	5
54	0	0	0	5	0	0	5
55	0	0	0	5	0	0	5
56	0	0	0	2	0	0	2
57	0	0	11	0	0	0	11
58	0	0	11	0	0	0	11
59	0	0	11	0	0	0	11
60	0	0	11	0	0	0	11
61	0	0	11	0	0	0	11
62	0	0	11	0	0	0	11
63	0	0	11	0	0	0	11
64	0	0	11	0	0	0	11
65	0	0	11	0	0	0	11
66	0	0	11	0	0	0	11
67	0	0	11	0	0	0	11
68	0	0	11	0	0	0	11
69	0	0	11	0	0	0	11
70	0	0	11	0	0	0	11
71	0	0	11	0	0	0	11
72	0	0	11	0	0	0	11
73	0	0	10	0	0	0	10
74	0	0	0	0	0	0	0
75	0	0	0	0	0	2	2
76	0	0	0	0	0	2	2
77	0	0	0	0	0	2	2
78	0	0	0	0	0	2	2
79	0	0	0	0	0	2	2
80	0	0	0	0	0	2	2
81	0	0	0	0	0	2	2
82	0	0	0	0	0	2	2
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	11	0	0	0	11
86	0	0	11	0	0	0	11
87	0	0	11	0	0	0	11
88	0	0	11	0	0	1	12
89	0	0	11	0	0	0	11
90	0	0	11	0	0	0	11

Airport: Albuquerque

Day	Category	1	2	3	4	5	6	Tot
1		0	0	7	5	0	0	12
2		0	0	7	5	0	0	12
3		0	0	7	5	0	0	12
4		0	0	7	5	0	0	12
5		0	0	7	5	0	0	12
6		0	0	7	5	0	0	12
7		0	0	7	6	0	0	13
8		0	0	7	0	0	0	7
9		0	0	7	0	0	2	9
10		0	0	7	0	0	2	9
11		0	0	7	0	0	0	7
12		0	0	7	0	0	0	7
13		0	0	7	0	0	1	8
14		0	0	7	0	0	0	7
15		0	0	7	0	0	0	7
16		0	0	7	0	0	0	7
17		0	0	7	0	0	0	7
18		0	0	4	0	0	0	4
19		0	0	0	0	0	0	0
20		0	0	0	0	0	0	0
21		0	0	0	0	0	0	0
22		0	0	0	0	0	0	0
23		0	0	0	0	0	0	0
24		0	0	0	0	0	0	0
25		0	0	0	0	0	0	0
26		0	0	0	0	0	0	0
27		0	0	0	0	0	0	0
28		0	0	0	0	0	0	0
29		0	0	7	0	0	0	7
30		0	0	7	0	0	0	7
31		0	0	7	0	0	0	7
32		0	0	7	0	0	0	7
33		0	0	7	0	0	0	7
34		0	0	7	0	0	0	7
35		0	0	7	0	0	0	7
36		0	0	7	0	0	0	7
37		0	0	7	0	0	0	7
38		0	0	7	0	0	0	7
39		0	0	7	0	0	0	7
40		0	0	7	0	0	0	7
41		0	0	7	0	0	0	7
42		0	0	7	0	0	0	7
43		0	0	7	0	0	0	7
44		0	0	7	0	0	0	7
45		0	0	7	0	0	0	7
46		0	0	4	0	0	2	6
47		0	0	0	0	0	2	2

48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	5	0	1	6
51	0	0	0	5	0	0	5
52	0	0	0	5	0	0	5
53	0	0	0	5	0	0	5
54	0	0	0	5	0	0	5
55	0	0	0	5	0	0	5
56	0	0	0	6	0	0	6
57	0	0	7	0	0	0	7
58	0	0	7	0	0	0	7
59	0	0	7	0	0	0	7
60	0	0	7	0	0	0	7
61	0	0	7	0	0	0	7
62	0	0	7	0	0	0	7
63	0	0	7	0	0	0	7
64	0	0	7	0	0	0	7
65	0	0	7	0	0	0	7
66	0	0	7	0	0	0	7
67	0	0	7	0	0	0	7
68	0	0	7	0	0	0	7
69	0	0	7	0	0	0	7
70	0	0	7	0	0	0	7
71	0	0	7	0	0	0	7
72	0	0	7	0	0	0	7
73	0	0	7	0	0	0	7
74	0	0	4	0	0	0	4
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	2	2
84	0	0	0	0	0	2	2
85	0	0	7	0	0	0	7
86	0	0	7	0	0	0	7
87	0	0	7	0	0	1	8
88	0	0	7	0	0	0	7
89	0	0	7	0	0	0	7
90	0	0	7	0	0	0	7

Airport: Ft Bliss

Category	1	2	3	4	5	6	Tot
Day							
1	0	0	30	57	1	0	88
2	0	0	30	57	1	0	88
3	0	0	30	57	1	0	88

4	0	0	30	57	1	0	88
5	0	0	30	57	1	0	88
6	0	0	30	57	1	0	88
7	0	0	30	47	0	0	77
8	0	0	30	0	0	0	30
9	0	0	30	0	0	0	30
10	0	0	30	0	0	0	30
11	0	0	30	0	0	2	32
12	0	0	30	0	0	0	30
13	0	0	30	0	0	0	30
14	0	0	30	0	0	1	31
15	0	0	30	0	0	0	30
16	0	0	30	0	0	0	30
17	0	0	30	0	0	0	30
18	0	0	29	0	0	0	29
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	30	0	0	0	30
30	0	0	30	0	0	0	30
31	0	0	30	0	0	0	30
32	0	0	30	0	0	0	30
33	0	0	30	0	1	0	31
34	0	0	30	0	1	0	31
35	0	0	30	0	1	0	31
36	0	0	30	0	1	0	31
37	0	0	30	0	1	0	31
38	0	0	30	0	1	0	31
39	0	0	30	0	0	0	30
40	0	0	30	0	0	0	30
41	0	0	30	0	0	0	30
42	0	0	30	0	0	0	30
43	0	0	30	0	0	0	30
44	0	0	30	0	0	0	30
45	0	0	30	0	0	0	30
46	0	0	29	0	0	0	29
47	0	0	0	0	0	0	0
48	0	0	0	0	0	2	2
49	0	0	0	0	0	0	0
50	0	0	0	57	0	0	57
51	0	0	0	57	0	1	58
52	0	0	0	57	0	0	57
53	0	0	0	57	0	0	57
54	0	0	0	57	0	0	57

55	0	0	0	57	0	0	57
56	0	0	0	47	0	0	47
57	0	0	30	0	0	0	30
58	0	0	30	0	0	0	30
59	0	0	30	0	0	0	30
60	0	0	30	0	0	0	30
61	0	0	30	0	0	0	30
62	0	0	30	0	0	0	30
63	0	0	30	0	0	0	30
64	0	0	30	0	0	0	30
65	0	0	30	0	1	0	31
66	0	0	30	0	1	0	31
67	0	0	30	0	1	0	31
68	0	0	30	0	1	0	31
69	0	0	30	0	1	0	31
70	0	0	30	0	1	0	31
71	0	0	30	0	0	0	30
72	0	0	30	0	0	0	30
73	0	0	30	0	0	0	30
74	0	0	29	0	0	0	29
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	30	0	0	2	32
86	0	0	30	0	0	0	30
87	0	0	30	0	0	0	30
88	0	0	30	0	0	1	31
89	0	0	30	0	0	0	30
90	0	0	30	0	0	0	30

Airport: Wichita

Category	1	2	3	4	5	6	Tot
Day							
1	0	0	3	6	0	0	9
2	0	0	3	6	0	0	9
3	0	0	3	6	0	0	9
4	0	0	3	6	0	0	9
5	0	0	3	6	0	0	9
6	0	0	3	6	0	0	9
7	0	0	3	6	0	0	9
8	0	0	3	0	0	0	3
9	0	0	3	0	0	0	3
10	0	0	3	0	0	0	3

11	0	0	3	0	0	0	3
12	0	0	3	0	0	0	3
13	0	0	3	0	0	0	3
14	0	0	3	0	0	0	3
15	0	0	4	0	0	1	5
16	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	3	0	0	0	3
30	0	0	3	0	0	0	3
31	0	0	3	0	0	0	3
32	0	0	3	0	0	0	3
33	0	0	3	0	0	0	3
34	0	0	3	0	0	0	3
35	0	0	3	0	0	0	3
36	0	0	3	0	0	0	3
37	0	0	3	0	0	0	3
38	0	0	3	0	0	0	3
39	0	0	3	0	0	0	3
40	0	0	3	0	0	0	3
41	0	0	3	0	0	0	3
42	0	0	3	0	0	0	3
43	0	0	4	0	0	0	4
44	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	6	0	0	6
51	0	0	0	6	0	0	6
52	0	0	0	6	0	1	7
53	0	0	0	6	0	0	6
54	0	0	0	6	0	0	6
55	0	0	0	6	0	0	6
56	0	0	0	6	0	0	6
57	0	0	3	0	0	0	3
58	0	0	3	0	0	0	3
59	0	0	3	0	0	0	3
60	0	0	3	0	0	0	3
61	0	0	3	0	0	0	3

62	0	0	3	0	0	0	3
63	0	0	3	0	0	0	3
64	0	0	3	0	0	0	3
65	0	0	3	0	0	0	3
66	0	0	3	0	0	0	3
67	0	0	3	0	0	0	3
68	0	0	3	0	0	0	3
69	0	0	3	0	0	0	3
70	0	0	3	0	0	0	3
71	0	0	4	0	0	0	4
72	0	0	0	0	0	0	0
73	0	0	0	0	0	0	0
74	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	3	0	0	0	3
86	0	0	3	0	0	0	3
87	0	0	3	0	0	0	3
88	0	0	3	0	0	0	3
89	0	0	3	0	0	1	4
90	0	0	3	0	0	0	3

<u>Heuristic</u> <u>Calculations</u>

Applicable Days: 1-6

<u>Clarke-Wright</u> <u>Calculations</u>

Route	C	U	T	S	Remarks
KBKF-KHIF-KBKF	>0	0	3.28	-	
KBKF-KABQ-KBKF	>0	0	2.86	-	
KBKF-KBIF-KBKF	0	>0	4.10	-	Feasible/Select
KBKF-KIAB-KBKF	>0	0	3.42	-	
KBKF-KBIF-KBKF	>0	0	4.10	-	
KBKF-KHIF-KABQ -KBKF	>0	0	5.53	.61	Feasible/Combine
KBKF-KHIF-KBIF -KBKF	0	>0	6.71	.67	Unfeasible/Cap

KBKF-KHIF-KIAB -KBKF	>0	0	6.70	0	
KBKF-KABQ-KBIF -KBKF	0	>0	5.12	1.84	Unfeasible/Cap
KBKF-KABQ-KIAB -KBKF	>0	0	5.70	.58	
KBKF-KBIF-KIAB -KBKF	0	>0	6.64	.88	Unfeasible/Cap
KBKF-KHIF-KABQ -KBIF-KBKF	0	>0	7.73	1.84	Unfeasible/Cap
KBKF-KHIF-KABQ -KIAB-KBKF	>0	0	8.37	.58	Feasible/Select
KBKF-KBIF-KBKF	>0	0	4.10	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KBKF-KHIF-KABQ-KIAB-KBKF
KBKF-KBIF-KBKF
KBKF-KBIF-KBKF

Total Time: 16.57
Aircraft Required: 2

Applicable Days: 7, 50-55

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KBKF-KHIF-KBKF	>0	0	3.28	-	
KBKF-KABQ-KBKF	>0	0	2.86	-	
KBKF-KBIF-KBKF	0	>0	4.10	-	Feasible/Select
KBKF-KIAB-KBKF	>0	0	3.42	-	
KBKF-KBIF-KBKF	>0	0	4.10	-	
KBKF-KHIF-KABQ -KBKF	>0	0	5.53	.61	
KBKF-KHIF-KBIF -KBKF	>0	0	6.71	.67	
KBKF-KHIF-KIAB -KBKF	>0	0	6.70	0	
KBKF-KABQ-KBIF -KBKF	>0	0	5.12	1.84	Feasible/Combine

KBKF-KABQ-KIAB -KBKF	>0	0	5.70	.58	
KBKF-KBIF-KIAB -KBKF	>0	0	6.64	.88	
KBKF-KABQ-KBIF -KHIF-KBKF	0	>0	7.73	1.84	Unfeasible/Cap
KBKF-KABQ-KBIF -KIAB-KBKF	0	>0	7.66	.88	Unfeasible/Cap
KBKF-KHIF-KIAB -KBKF	>0	0	6.70	0	Feasible/Select
KBKF-KABQ-KBIF -KBKF	>0	0	5.12	1.84	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KBKF-KHIF-KIAB-KBKF
KBKF-KABQ-KBIF-KBKF
KBKF-KBIF-KBKF

Total Time: 15.92
Aircraft Required: 3

Applicable Days: 8-15, 29-43, 57-71, 85-90

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KBKF-KHIF-KBKF	>0	0	3.28	-	
KBKF-KABQ-KBKF	>0	0	2.86	-	
KBKF-KBIF-KBKF	>0	0	4.10	-	
KBKF-KIAB-KBKF	>0	0	3.42	-	
KBKF-KHIF-KABQ -KBKF	>0	0	5.53	.61	
KBKF-KHIF-KBIF -KBKF	>0	0	6.71	.67	
KBKF-KHIF-KIAB -KBKF	>0	0	6.70	0	
KBKF-KABQ-KBIF -KBKF	>0	0	5.12	1.84	Feasible/Combine
KBKF-KABQ-KIAB -KBKF	>0	0	5.70	.58	

KBKF-KBIF-KIAB -KBKF	>0	0	6.64	.88	
KBKF-KABQ-KBIF -KHIF-KBKF	0	>0	7.73	1.84	Unfeasible/Cap
KBKF-KABQ-KBIF -KIAB-KBKF	>0	0	7.66	.88	Feasible/Select
KBKF-KHIF-KBKF	>0	0	3.28	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KBKF-KHIF-KBKF
KBKF-KABQ-KBIF-KIAB-KBKF

Total Time: 10.94
Aircraft Required: 2

Applicable Days: 16-17, 44-45, 72-73

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KBKF-KHIF-KBKF	>0	0	3.28	-	
KBKF-KABQ-KBKF	>0	0	2.86	-	
KBKF-KBIF-KBKF	>0	0	4.10	-	
KBKF-KHIF-KABQ -KBKF	>0	0	5.53	.61	
KBKF-KHIF-KBIF -KBKF	>0	0	6.71	.67	
KBKF-KABQ-KBIF -KBKF	>0	0	5.12	1.84	Feasible/Combine
KBKF-KABQ-KBIF -KHIF-KBKF	>0	0	7.73	1.84	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KBKF-KABQ-KBIF-KHIF-KBKF

Total Time: 7.73
Aircraft Required: 1

Applicable Days: 18, 46, 74

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KBKF-KABQ-KBKF	>0	0	2.86	-	
KBKF-KBIF-KBKF	>0	0	4.10	-	
KBKF-KABQ-KBIF -KBKF	>0	0	5.12	1.84	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KBKF-KABQ-KBIF-KBKF

Total Time: 5.12
Aircraft Required: 1

Applicable Days: 47, 83-84

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KBKF-KABQ-KBKF	>0	0	2.86	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KBKF-KABQ-KBKF

Total Time: 2.86
Aircraft Required: 1

Applicable Days: 48

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KBKF-KBIF-KBKF	>0	0	4.10	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KBKF-KBIF-KBKF

Total Time: 4.10
Aircraft Required: 1

Applicable Days: 56

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KBKF-KHIF-KBKF	>0	0	3.28	-	
KBKF-KABQ-KBKF	>0	0	2.86	-	
KBKF-KBIF-KBKF	>0	0	4.10	-	
KBKF-KIAB-KBKF	>0	0	3.42	-	
KBKF-KHIF-KABQ -KBKF	>0	0	5.53	.61	Feasible/Combine
KBKF-KHIF-KBIF -KBKF	0	>0	6.71	.67	Unfeasible/Cap
KBKF-KHIF-KIAB -KBKF	>0	0	6.70	0	
KBKF-KABQ-KBIF -KBKF	0	>0	5.12	1.84	Unfeasible/Cap
KBKF-KABQ-KIAB -KBKF	>0	0	5.70	.58	
KBKF-KBIF-KIAB -KBKF	0	>0	6.64	.88	Unfeasible/Cap
KBKF-KHIF-KABQ -KIAB-KBKF	>0	0	8.37	.58	Feasible/Select
KBKF-KHIF-KABQ -KBIF-KBKF	0	>0	7.73	1.84	Unfeasible/Cap
KBKF-KBIF-KBKF	>0	0	4.10	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KBKF-KHIF-KABQ-KIAB-KBKF
KBKF-KBIF-KBKF

Total Time: 11.83
Aircraft Required: 2

Applicable Days: 76-82

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KBKF-KHIF-KBKF	>0	0	3.28	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KBKF-KHIF-KBKF

Total Time: 3.28
Aircraft Required: 1

Applicable Days: 19-28, 49, 75

No Routes or Aircraft Required

Appendix J: Routing Calculations for the Philadelphia Network

Ninety Day Patient Delivery Schedules

Airport: Syracuse

Day \ Category	1	2	3	4	5	6	Tot
1	0	0	3	2	0	0	5
2	0	0	3	2	0	0	5
3	0	0	3	2	0	0	5
4	0	0	3	2	0	0	5
5	0	0	3	2	0	0	5
6	0	0	3	2	0	0	5
7	0	0	3	4	0	0	7
8	0	0	3	0	0	0	3
9	0	0	3	0	0	0	3
10	0	0	3	0	0	0	3
11	0	0	3	0	0	5	8
12	0	0	3	0	0	16	19
13	0	0	3	0	0	16	19
14	0	0	3	0	0	1	4
15	0	0	3	0	0	0	3
16	0	0	2	0	0	0	2
17	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	3	0	0	0	3
30	0	0	3	0	0	0	3
31	0	0	3	0	0	0	3
32	0	0	3	0	0	0	3
33	0	0	3	0	0	0	3
34	0	0	3	0	0	0	3
35	0	0	3	0	0	0	3
36	0	0	3	0	0	0	3
37	0	0	3	0	0	0	3
38	0	0	3	0	0	0	3
39	0	0	3	0	0	0	3
40	0	0	3	0	0	0	3

41	0	0	3	0	0	0	3
42	0	0	3	0	0	0	3
43	0	0	3	0	0	0	3
44	0	0	2	0	0	0	2
45	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0
48	0	0	0	0	0	5	5
49	0	0	0	0	0	16	16
50	0	0	0	2	0	16	18
51	0	0	0	2	0	1	3
52	0	0	0	2	0	0	2
53	0	0	0	2	0	0	2
54	0	0	0	2	0	0	2
55	0	0	0	2	0	0	2
56	0	0	0	2	0	0	2
57	0	0	3	2	0	0	5
58	0	0	3	0	0	0	3
59	0	0	3	0	0	0	3
60	0	0	3	0	0	0	3
61	0	0	3	0	0	0	3
62	0	0	3	0	0	0	3
63	0	0	3	0	0	0	3
64	0	0	3	0	0	0	3
65	0	0	3	0	0	0	3
66	0	0	3	0	0	0	3
67	0	0	3	0	0	0	3
68	0	0	3	0	0	0	3
69	0	0	3	0	0	0	3
70	0	0	3	0	0	0	3
71	0	0	3	0	0	0	3
72	0	0	2	0	0	0	2
73	0	0	0	0	0	0	0
74	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	3	0	0	5	8
86	0	0	3	0	0	16	19
87	0	0	3	0	0	16	19
88	0	0	3	0	0	1	4
89	0	0	3	0	0	0	3
90	0	0	3	0	0	0	3

Airport: Buffalo

Day \ Category	1	2	3	4	5	6	Tot
1	0	0	38	30	0	0	68
2	0	0	38	30	0	0	68
3	0	0	38	30	0	0	68
4	0	0	38	30	0	0	68
5	0	0	38	30	0	0	68
6	0	0	38	30	0	0	68
7	0	0	38	22	0	0	60
8	0	0	38	0	0	0	38
9	0	0	38	0	0	0	38
10	0	0	38	0	0	0	38
11	0	0	38	0	0	0	38
12	0	0	38	0	0	0	38
13	0	0	38	0	0	0	38
14	0	0	38	0	0	15	53
15	0	0	38	0	0	2	40
16	0	0	38	0	0	0	38
17	0	0	38	0	0	0	38
18	0	0	25	0	0	0	25
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	38	0	0	0	38
30	0	0	38	0	0	0	38
31	0	0	38	0	0	0	38
32	0	0	38	0	0	0	38
33	0	0	38	0	0	0	38
34	0	0	38	0	0	0	38
35	0	0	38	0	0	0	38
36	0	0	38	0	0	0	38
37	0	0	38	0	0	0	38
38	0	0	38	0	0	0	38
39	0	0	38	0	0	0	38
40	0	0	38	0	0	0	38
41	0	0	38	0	0	0	38
42	0	0	38	0	0	0	38
43	0	0	38	0	0	0	38
44	0	0	38	0	0	0	38
45	0	0	38	0	0	0	38
46	0	0	25	0	0	0	25
47	0	0	0	0	0	0	0

48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	30	0	0	30
51	0	0	0	30	0	15	45
52	0	0	0	30	0	2	32
53	0	0	0	30	0	0	30
54	0	0	0	30	0	0	30
55	0	0	0	30	0	0	30
56	0	0	0	22	0	0	22
57	0	0	38	0	0	0	38
58	0	0	38	0	0	0	38
59	0	0	38	0	0	0	38
60	0	0	38	0	0	0	38
61	0	0	38	0	0	0	38
62	0	0	38	0	0	0	38
63	0	0	38	0	0	0	38
64	0	0	38	0	0	0	38
65	0	0	38	0	0	0	38
66	0	0	38	0	0	0	38
67	0	0	38	0	0	0	38
68	0	0	38	0	0	0	38
69	0	0	38	0	0	0	38
70	0	0	38	0	0	0	38
71	0	0	38	0	0	0	38
72	0	0	38	0	0	0	38
73	0	0	38	0	0	0	38
74	0	0	25	0	0	0	25
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	38	0	0	0	38
86	0	0	38	0	0	0	38
87	0	0	38	0	0	0	38
88	0	0	38	0	0	15	53
89	0	0	38	0	0	2	40
90	0	0	38	0	0	0	38

Airport: Pittsburgh

Day	Category	1	2	3	4	5	6	Tot
1		0	0	53	20	0	0	73
2		0	0	53	20	0	0	73
3		0	0	53	20	0	0	73

4	0	0	53	20	0	0	73
5	0	0	53	20	0	0	73
6	0	0	53	20	0	0	73
7	0	0	53	14	0	0	67
8	0	0	53	0	0	0	53
9	0	0	53	0	0	0	53
10	0	0	53	0	0	0	53
11	0	0	53	0	0	0	53
12	0	0	53	0	0	0	53
13	0	0	53	0	0	0	53
14	0	0	53	0	0	0	53
15	0	0	53	0	0	10	63
16	0	0	53	0	0	0	53
17	0	0	53	0	0	0	53
18	0	0	45	0	0	0	45
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	53	0	0	0	53
30	0	0	53	0	0	0	53
31	0	0	53	0	0	0	53
32	0	0	53	0	0	0	53
33	0	0	53	0	0	0	53
34	0	0	53	0	0	0	53
35	0	0	53	0	0	0	53
36	0	0	53	0	0	0	53
37	0	0	53	0	0	0	53
38	0	0	53	0	0	0	53
39	0	0	53	0	0	0	53
40	0	0	53	0	0	0	53
41	0	0	53	0	0	0	53
42	0	0	53	0	0	0	53
43	0	0	53	0	0	0	53
44	0	0	53	0	0	0	53
45	0	0	53	0	0	0	53
46	0	0	45	0	0	0	45
47	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	20	0	0	20
51	0	0	0	20	0	0	20
52	0	0	0	20	0	10	30
53	0	0	0	20	0	0	20
54	0	0	0	20	0	0	20

55	0	0	0	20	0	0	20
56	0	0	0	14	0	0	14
57	0	0	53	0	0	0	53
58	0	0	53	0	0	0	53
59	0	0	53	0	0	0	53
60	0	0	53	0	0	0	53
61	0	0	53	0	0	0	53
62	0	0	53	0	0	0	53
63	0	0	53	0	0	0	53
64	0	0	53	0	0	0	53
65	0	0	53	0	0	0	53
66	0	0	53	0	0	0	53
67	0	0	53	0	0	0	53
68	0	0	53	0	0	0	53
69	0	0	53	0	0	0	53
70	0	0	53	0	0	0	53
71	0	0	53	0	0	0	53
72	0	0	53	0	0	0	53
73	0	0	53	0	0	0	53
74	0	0	45	0	0	0	45
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	53	0	0	0	53
86	0	0	53	0	0	0	53
87	0	0	53	0	0	0	53
88	0	0	53	0	0	0	53
89	0	0	53	0	0	10	63
90	0	0	53	0	0	0	53

Airport: Washington D.C.

Day	Category 1	2	3	4	5	6	Tot
1	0	0	79	105	0	0	184
2	0	0	79	105	0	0	184
3	0	0	79	105	0	0	184
4	0	0	79	105	0	0	184
5	0	0	79	105	0	0	184
6	0	0	79	105	0	0	184
7	0	0	79	81	0	10	170
8	0	0	79	0	0	13	92
9	0	0	79	0	0	0	81
10	0	0	79	0	0	0	79

11	0	0	79	0	0	0	79
12	0	0	79	0	0	0	79
13	0	0	79	0	0	2	81
14	0	0	79	0	0	2	81
15	0	0	79	0	0	1	80
16	0	0	79	0	0	0	79
17	0	0	79	0	0	0	79
18	0	0	60	0	0	0	60
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	79	0	0	0	79
30	0	0	79	0	0	0	79
31	0	0	79	0	0	0	79
32	0	0	79	0	0	0	79
33	0	0	79	0	0	0	79
34	0	0	79	0	0	0	79
35	0	0	79	0	0	0	79
36	0	0	79	0	0	0	79
37	0	0	79	0	0	0	79
38	0	0	79	0	0	0	79
39	0	0	79	0	0	0	79
40	0	0	79	0	0	0	79
41	0	0	79	0	0	0	79
42	0	0	79	0	0	0	79
43	0	0	79	0	0	0	79
44	0	0	79	0	0	10	89
45	0	0	79	0	0	13	92
46	0	0	60	0	0	0	60
47	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	105	0	2	107
51	0	0	0	105	0	2	107
52	0	0	0	105	0	1	106
53	0	0	0	105	0	0	105
54	0	0	0	105	0	0	105
55	0	0	0	105	0	0	105
56	0	0	0	81	0	0	81
57	0	0	79	0	0	0	79
58	0	0	79	0	0	0	79
59	0	0	79	0	0	0	79
60	0	0	79	0	0	0	79
61	0	0	79	0	0	0	79

62	0	0	79	0	0	0	79
63	0	0	79	0	0	0	79
64	0	0	79	0	0	0	79
65	0	0	79	0	0	0	79
66	0	0	79	0	0	0	79
67	0	0	79	0	0	0	79
68	0	0	79	0	0	0	79
69	0	0	79	0	0	0	79
70	0	0	79	0	0	0	79
71	0	0	79	0	0	0	79
72	0	0	79	0	0	0	79
73	0	0	79	0	0	0	79
74	0	0	60	0	0	0	60
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	10	10
82	0	0	0	0	0	13	13
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	79	0	0	0	79
86	0	0	79	0	0	0	79
87	0	0	79	0	0	0	79
88	0	0	79	0	0	0	79
89	0	0	79	0	0	0	79
90	0	0	79	0	0	0	79

Airport: Norfolk

Day / Category	1	2	3	4	5	6	Tot
1	0	0	60	63	0	0	123
2	0	0	60	63	0	0	123
3	0	0	60	63	0	0	123
4	0	0	60	63	0	0	123
5	0	0	60	63	0	0	123
6	0	0	60	63	0	0	123
7	0	0	60	56	0	0	116
8	0	0	60	0	0	3	63
9	0	0	60	0	0	16	76
10	0	0	60	0	0	16	76
11	0	0	60	0	0	11	71
12	0	0	60	0	0	0	60
13	0	0	60	0	0	0	60
14	0	0	60	0	0	0	60
15	0	0	60	0	0	0	60
16	0	0	60	0	0	0	60
17	0	0	60	0	0	0	60

18	0	0	41	0	0	0	41
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	60	0	0	0	60
30	0	0	60	0	0	0	60
31	0	0	60	0	0	0	60
32	0	0	60	0	0	0	60
33	0	0	60	0	0	0	60
34	0	0	60	0	0	0	60
35	0	0	60	0	0	0	60
36	0	0	60	0	0	0	60
37	0	0	60	0	0	0	60
38	0	0	60	0	0	0	60
39	0	0	60	0	0	0	60
40	0	0	60	0	0	0	60
41	0	0	60	0	0	0	60
42	0	0	60	0	0	0	60
43	0	0	60	0	0	0	60
44	0	0	60	0	0	0	60
45	0	0	60	0	0	3	63
46	0	0	41	0	0	16	57
47	0	0	0	0	0	16	16
48	0	0	0	0	0	11	11
49	0	0	0	0	0	0	0
50	0	0	0	63	0	0	63
51	0	0	0	63	0	0	63
52	0	0	0	63	0	0	63
53	0	0	0	63	0	0	63
54	0	0	0	63	0	0	63
55	0	0	0	63	0	0	63
56	0	0	0	56	0	0	56
57	0	0	60	0	0	0	60
58	0	0	60	0	0	0	60
59	0	0	60	0	0	0	60
60	0	0	60	0	0	0	60
61	0	0	60	0	0	0	60
62	0	0	60	0	0	0	60
63	0	0	60	0	0	0	60
64	0	0	60	0	0	0	60
65	0	0	60	0	0	0	60
66	0	0	60	0	0	0	60
67	0	0	60	0	0	0	60
68	0	0	60	0	0	0	60

69	0	0	60	0	0	0	60
70	0	0	60	0	0	0	60
71	0	0	60	0	0	0	60
72	0	0	60	0	0	0	60
73	0	0	60	0	0	0	60
74	0	0	41	0	0	0	41
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	3	3
83	0	0	0	0	0	16	16
84	0	0	0	0	0	16	16
85	0	0	60	0	0	11	71
86	0	0	60	0	0	0	60
87	0	0	60	0	0	0	60
88	0	0	60	0	0	0	60
89	0	0	60	0	0	0	60
90	0	0	60	0	0	0	60

Heuristic Calculations

Applicable Days: 1-6

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KPHL-KSYR-KPHL	>0	0	2.34	-	
KPHL-KBUF-KPHL	0	>0	2.86	-	Feasible/Select
KPHL-KPIT-KPHL	0	>0	3.01	-	Feasible/Select
KPHL-KADW-KPHL	0	>0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	0	>0	2.25	-	Feasible/Select
KPHL-KBUF-KPHL	>0	0	2.86	-	
KPHL-KPIT-KPHL	>0	0	3.01	-	
KPHL-KADW-KPHL	0	>0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	0	>0	2.25	-	Feasible/Select
KPHL-KADW-KPHL	0	>0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	>0	0	2.25	-	
KPHL-KADW-KPHL	>0	0	1.75	-	
KPHL-KSYR-KBUF -KPHL	>0	0	4.13	1.07	
KPHL-KSYR-KPIT -KPHL	>0	0	4.66	.69	

KPHL-KSYR-KADW -KPHL	>0	0	3.98	.11	
KPHL-KSYR-KORF -KPHL	>0	0	4.54	.05	
KPHL-KBUF-KPIT -KPHL	>0	0	4.51	1.36	Feasible/Combine
KPHL-KBUF-KADW -KPHL	0	>0	4.30	.31	
KPHL-KBUF-KORF -KPHL	>0	0	4.87	.24	
KPHL-KPIT-KADW -KPHL	0	>0	4.23	.53	
KPHL-KPIT-KORF -KPHL	0	>0	4.71	.55	
KPHL-KADW-KORF -KPHL	0	>0	3.33	.70	
KPHL-KSYR-KBUF -KPIT-KPHL	0	>0	5.77	1.08	Unfeasible/Cap
KPHL-KBUF-KPIT -KADW-KPHL	0	>0	5.72	.54	Unfeasible/Cap
KPHL-KBUF-KPIT -KORF-KPHL	0	>0	6.21	.55	Unfeasible/Cap
KPHL-KSYR-KADW -KPHL	>0	0	3.98	.11	Feasible/Select
KPHL-KSYR-KORF -KPHL	>0	0	4.54	.05	
KPHL-KBUF-KPIT -KPHL	>0	0	4.51	1.36	Feasible/Select
KPHL-KADW-KORF -KPHL	0	>0	3.33	.70	
KPHL-KORF-KPHL	>0	0	2.25	-	Feasible/Select

Split Delivery Calculations

Route	C	U	T	S	Remarks
KPHL-KORF-KSYR -KPHL + KPHL -KADW-KSYR-KPHL	0	0	12.06	-1.32	No Savings

Selected Routes

KPHL-KSYR-KADW-KPHL
KPHL-KBUF-KPIT-KPHL
KPHL-KPIT-KPHL
KPHL-KADW-KPHL
KPHL-KADW-KPHL
KPHL-KADW-KPHL

KPHL-KORF-KPHL
KPHL-KORF-KPHL
KPHL-KORF-KPHL

Total Time: 23.50
Aircraft Required: 4

Applicable Days: 7, 88

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KPHL-KSYR-KPHL	>0	0	2.34	-	
KPHL-KBUF-KPHL	0	>0	2.86	-	Feasible/Select
KPHL-KPIT-KPHL	0	>0	3.01	-	Feasible/Select
KPHL-KADW-KPHL	0	>0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	0	>0	2.25	-	Feasible/Select
KPHL-KBUF-KPHL	>0	0	2.86	-	
KPHL-KPIT-KPHL	>0	0	3.01	-	
KPHL-KADW-KPHL	0	>0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	0	>0	2.25	-	Feasible/Select
KPHL-KADW-KPHL	0	>0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	>0	0	2.25	-	
KPHL-KADW-KPHL	>0	0	1.75	-	
KPHL-KSYR-KBUF -KPHL	>0	0	4.13	1.07	
KPHL-KSYR-KPIT -KPHL	>0	0	4.66	.69	
KPHL-KSYR-KADW -KPHL	>0	0	3.98	.11	
KPHL-KSYR-KORF -KPHL	>0	0	4.54	.05	
KPHL-KBUF-KPIT -KPHL	>0	0	4.51	1.36	Feasible/Combine
KPHL-KBUF-KADW -KPHL	0	>0	4.30	.31	
KPHL-KBUF-KORF -KPHL	>0	0	4.87	.24	
KPHL-KPIT-KADW -KPHL	0	>0	4.23	.53	
KPHL-KPIT-KORF -KPHL	0	>0	4.71	.55	
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	

KPHL-KSYR-KBUF -KPIT-KPHL	>0	0	5.77	1.08	Feasible/Select
KPHL-KBUF-KPIT -KADW-KPHL	0	>0	5.72	.54	
KPHL-KBUF-KPIT -KORF-KPHL	0	>0	6.21	.55	
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	Feasible/Select

<u>Split Delivery Calculations</u>

** No Splits Possible **

<u>Selected Routes</u>

KPHL-KBUF-KPHL
KPHL-KPIT-KPHL
KPHL-KADW-KPHL
KPHL-KADW-KPHL
KPHL-KADW-KPHL
KPHL-KORF-KPHL
KPHL-KORF-KPHL
KPHL-KSYR-KBUF-KPIT-KPHL
KPHL-KADW-KORF-KPHL

Total Time: 24.72
Aircraft Required: 4

Applicable Days: 8-10, 44

<u>Clarke-Wright Calculations</u>

Route	C	U	T	S	Remarks
KPHL-KSYR-KPHL	>0	0	2.34	-	
KPHL-KBUF-KPHL	>0	0	2.86	-	
KPHL-KPIT-KPHL	0	>0	3.01	-	Feasible/Select
KPHL-KADW-KPHL	0	>0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	0	>0	2.25	-	Feasible/Select
KPHL-KPIT-KPHL	>0	0	3.01	-	
KPHL-KADW-KPHL	>0	0	1.75	-	
KPHL-KORF-KPHL	>0	0	2.25	-	
KPHL-KSYR-KBUF -KPHL	>0	0	4.15	1.07	
KPHL-KSYR-KPIT -KPHL	>0	0	4.66	.69	

KPHL-KSYR-KADW -KPHL	>0	0	3.98	.11	
KPHL-KSYR-KORF -KPHL	>0	0	4.54	.05	
KPHL-KBUF-KPIT -KPHL	>0	0	4.51	1.36	Feasible/Select
KPHL-KBUF-KADW -KPHL	0	>0	4.30	.31	
KPHL-KBUF-KORF -KPHL	0	>0	4.87	.24	
KPHL-KPIT-KADW -KPHL	0	>0	4.23	.53	
KPHL-KPIT-KORF -KPHL	>0	0	4.71	.55	
KPHL-KADW-KORF -KPHL	0	>0	3.33	.70	
KPHL-KSYR-KBUF -KPIT-KPHL	>0	0	5.77	.90	Feasible/Select
KPHL-KADW-KORF -KPHL	0	>0	3.33	.70	Unfeasible/Cap
KPHL-KADW-KPHL	>0	0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	>0	0	2.25	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KPHL-KPIT-KPHL
KPHL-KADW-KPHL
KPHL-KADW-KPHL
KPHL-KORF-KPHL
KPHL-KORF-KPHL
KPHL-KSYR-KBUF-KPIT-KPHL

Total Time: 16.78
Aircraft Required: 3

Applicable Days: 11, 85

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KPHL-KSYR-KPHL	>0	0	2.34	-	
KPHL-KBUF-KPHL	>0	0	2.86	-	

KPHL-KPIT-KPHL	0	>0	3.01	-	Feasible/Select
KPHL-KADW-KPHL	0	>0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	0	>0	2.25	-	Feasible/Select
KPHL-KPIT-KPHL	>0	0	3.01	-	
KPHL-KADW-KPHL	>0	0	1.75	-	
KPHL-KORF-KPHL	>0	0	2.25	-	
KPHL-KSYR-KBUF -KPHL	>0	0	4.15	1.07	
KPHL-KSYR-KPIT -KPHL	>0	0	4.66	.69	
KPHL-KSYR-KADW -KPHL	>0	0	3.98	.11	
KPHL-KSYR-KORF -KPHL	>0	0	4.54	.05	
KPHL-KBUF-KPIT -KPHL	>0	0	4.51	1.36	Feasible/Combine
KPHL-KBUF-KADW -KPHL	0	>0	4.30	.31	
KPHL-KBUF-KORF -KPHL	0	>0	4.87	.24	
KPHL-KPIT-KADW -KPHL	>0	0	4.23	.53	
KPHL-KPIT-KORF -KPHL	>0	0	4.71	.55	
KPHL-KADW-KORF -KPHL	0	>0	3.33	.70	
KPHL-KSYR-KBUF -KPIT-KPHL	0	>0	5.77	1.08	Unfeasible/Cap
KPHL-KBUF-KPIT -KADW-KPHL	0	>0	5.72	.54	Unfeasible/Cap
KPHL-KBUF-KPIT -KORF-KPHL	0	>0	6.21	.55	Unfeasible/Cap
KPHL-KSYR-KADW -KPHL	>0	0	3.98	.11	Feasible/Select
KPHL-KSYR-KORF -KPHL	>0	0	4.54	.05	
KPHL-KBUF-KPIT -KPHL	>0	0	4.51	1.36	Feasible/Select
KPHL-KADW-KORF -KPHL	0	>0	3.33	.70	Unfeasible/Cap
KPHL-KORF-KPHL	>0	0	2.25	-	Feasible/Select

Split Delivery Calculations

Route	C	U	T	S	Remarks
KPHL-KORF-KADW -KPHL + KPHL -KBUF-KPIT-KADW -KPHL	0	0	11.39	-.65	No Savings

Selected Routes

KPHL-KSYR-KADW-KPHL
KPHL-KPIT-KBUF-KPHL
KPHL-KPIT-KPHL
KPHL-KADW-KPHL
KPHL-KORF-KPHL

Total Time: 15.50
Aircraft Required: 3

Applicable Days: 12-13, 86-87

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KPHL-KSYR-KPHL	>0	0	2.34	-	
KPHL-KBUF-KPHL	>0	0	2.86	-	
KPHL-KPIT-KPHL	0	>0	3.01	-	Feasible/Select
KPHL-KADW-KPHL	0	>0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	0	>0	2.25	-	Feasible/Select
KPHL-KPIT-KPHL	>0	0	3.01	-	
KPHL-KADW-KPHL	>0	0	1.75	-	
KPHL-KORF-KPHL	>0	0	2.25	-	
KPHL-KSYR-KBUF -KPHL	0	>0	3.66	1.54	Unfeasible/Cap
KPHL-KSYR-KPIT -KPHL	>0	0	4.66	.69	
KPHL-KSYR-KADW -KPHL	0	>0	3.98	.11	
KPHL-KSYR-KORF -KPHL	>0	0	4.54	.05	
KPHL-KBUF-KPIT -KPHL	>0	0	4.51	1.36	Feasible/Combine
KPHL-KBUF-KADW -KPHL	0	>0	4.30	.31	
KPHL-KBUF-KORF -KPHL	0	>0	4.87	.24	

KPHL-KPIT-KADW -KPHL	>0	0	4.23	.53	
KPHL-KPIT-KORF -KPHL	>0	0	4.71	.55	
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	
KPHL-KBUF-KPIT -KADW-KPHL	0	>0	5.72	.54	Unfeasible/Cap
KPHL-KBUF-KPIT -KORF-KPHL	0	>0	6.21	.55	Unfeasible/Cap
KPHL-KSYR-KADW -KPHL	0	>0	3.98	.11	
KPHL-KSYR-KORF -KPHL	>0	0	4.54	.05	
KPHL-KBUF-KPIT -KPHL	>0	0	4.51	1.36	Feasible/Select
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	Feasible/Combine
KPHL-KORF-KADW -KSYR-KPHL	0	>0	5.53	.14	Unfeasible/Cap
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	Feasible/Select
KPHL-KSYR-KPHL	>0	0	2.34	-	Feasible/Select

<u>Split Delivery Calculations</u>

Route	C	U	T	S	Remarks
KPHL-KSYR-KPIT-KPHL + KPHL-KORF -KADW-KPIT-KPHL	0	0	10.46	-.28	No Savings

<u>Selected Routes</u>

KPHL-KSYR-KPHL
KPHL-KPIT-KPHL
KPHL-KADW-KPHL
KPHL-KORF-KPHL
KPHL-KBUF-KPIT-KPHL
KPHL-KORF-KADW-KPHL

Total Time: 17.19
Aircraft Required: 3

Applicable Days: 14

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KPHL-KSYR-KPHL	>0	0	2.34	-	
KPHL-KBUF-KPHL	0	>0	2.86	-	Feasible Select
KPHL-KPIT-KPHL	0	>0	3.01	-	Feasible/Select
KPHL-KADW-KPHL	0	>0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	0	>0	2.25	-	Feasible/Select
KPHL-KBUF-KPHL	>0	0	2.86	-	
KPHL-KPIT-KPHL	>0	0	3.01	-	
KPHL-KADW-KPHL	>0	0	1.75	-	
KPHL-KORF-KPHL	>0	0	2.25	-	
KPHL-KSYR-KBUF -KPHL	>0	0	4.15	1.07	
KPHL-KSYR-KPIT -KPHL	>0	0	4.66	.69	
KPHL-KSYR-KADW -KPHL	>0	0	3.98	.11	
KPHL-KSYR-KORF -KPHL	>0	0	4.54	.05	
KPHL-KBUF-KPIT -KPHL	>0	0	4.51	1.36	Feasible/Combine
KPHL-KBUF-KADW -KPHL	>0	0	4.30	.31	
KPHL-KBUF-KORF -KPHL	>0	0	4.87	.24	
KPHL-KPIT-KADW -KPHL	>0	0	4.23	.53	
KPHL-KPIT-KORF -KPHL	>0	0	4.71	.55	
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	
KPHL-KSYR-KBUF -KPIT-KPHL	>0	0	5.77	1.08	Feasible/Combine
KPHL-KBUF-KPIT -KADW-KPHL	>0	0	5.72	.54	
KPHL-KBUF-KPIT -KORF-KPHL	>0	0	6.21	.55	
KPHL-KSYR-KBUF -KPIT-KADW-KPHL	>0	0	6.98	.54	
KPHL-KSYR-KBUF -KPIT-KORF-KPHL	>0	0	7.48	.54	
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	Feasible/Select

KPHL-KSYR-KBUF -KPIT-KPHL	>0	0	5.77	.90	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KPLH-KBUF-KPHL
KPHL-KPIT-KPHL
KPHL-KADW-KPHL
KPHL-KORF-KPHL
KPHL-KORF-KADW-KPHL
KPHL-KSYR-KBUF-KPIT-KPHL

Total Time: 18.97
Aircraft Required: 3

Applicable Days: 15, 89

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KPHL-KSYR-KPHL	>0	0	2.34	-	
KPHL-KBUF-KPHL	>0	0	2.86	-	
KPHL-KPIT-KPHL	0	>0	3.01	-	Feasible/Select
KPHL-KADW-KPHL	0	>0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	0	>0	2.25	-	Feasible/Select
KPHL-KPIT-KPHL	>0	0	3.01	-	
KPHL-KADW-KPHL	>0	0	1.75	-	
KPHL-KORF-KPHL	>0	0	2.25	-	
KPHL-KSYR-KBUF -KPHL	>0	0	4.15	1.07	
KPHL-KSYR-KPIT -KPHL	>0	0	4.66	.69	
KPHL-KSYR-KADW -KPHL	>0	0	3.98	.11	
KPHL-KSYR-KORF -KPHL	>0	0	4.54	.05	
KPHL-KBUF-KPIT -KPHL	0	>0	4.51	1.36	Feasible/Combine
KPHL-KBUF-KADW -KPHL	0	>0	4.30	.31	
KPHL-KBUF-KORF -KPHL	0	>0	4.87	.24	

KPHL-KPIT-KADW -KPHL	>0	0	4.23	.53	
KPHL-KPIT-KORF -KPHL	>0	0	4.71	.55	
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	
KPHL-KPIT-KBUF -KPHL	>0	0	4.51	1.36	Feasible/Select
KPHL-KSYR-KADW -KPHL	>0	0	3.98	.11	
KPHL-KSYR-KORF -KPHL	>0	0	4.54	.05	
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	Feasible/Combine
KPHL-KORF-KADW -KSYR-KPHL	>0	0	5.55	.12	
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	Feasible/Select
KPHL-KSYR-KPHL	>0	0	2.34	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KPHL-KPIT-KPHL
KPHL-KADW-KPHL
KPHL-KORF-KPHL
KPHL-KSYR-KPHL
KPHL-KORF-KADW-KPHL
KPHL-KBUF-KPIT-KPHL

Total Time: 17.19
Aircraft Required: 3

Applicable Days: 16, 29-43, 57-72, 90

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KPHL-KSYR-KPHL	>0	0	2.34	-	
KPHL-KBUF-KPHL	>0	0	2.86	-	
KPHL-KPIT-KPHL	0	>0	3.01	-	Feasible/Select
KPHL-KADW-KPHL	0	>0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	0	>0	2.25	-	Feasible/Select

KPHL-KPIT-KPHL	>0	0	3.01	-	
KPHL-KADW-KPHL	>0	0	1.75	-	
KPHL-KORF-KPHL	>0	0	2.25	-	
KPHL-KSYR-KBUF -KPHL	>0	0	4.15	1.07	
KPHL-KSYR-KPIT -KPHL	>0	0	4.66	.69	
KPHL-KSYR-KADW -KPHL	>0	0	3.98	.11	
KPHL-KSYR-KORF -KPHL	>0	0	4.54	.05	
KPHL-KBUF-KPIT -KPHL	>0	0	4.51	1.36	Feasible/Combine
KPHL-KBUF-KADW -KPHL	0	>0	4.30	.31	
KPHL-KBUF-KORF -KPHL	0	>0	4.87	.24	
KPHL-KPIT-KADW -KPHL	>0	0	4.23	.53	
KPHL-KPIT-KORF -KPHL	>0	0	4.71	.55	
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	
KPHL-KSYR-KBUF -KPIT-KPHL	>0	0	5.77	.90	Feasible/Select
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	Feasible/Select

<u>Split Delivery Calculations</u>

** No Splits Possible **

<u>Selected Routes</u>

KPHL-KPIT-KPHL
KPHL-KADW-KPHL
KPHL-KORF-KPHL
KPHL-KORF-KADW-KPHL
KPHL-KSYR-KBUF-KPIT-KPHL

Total Time: 16.11
Aircraft Required: 2

Applicable Days: 17, 73

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KPHL-KBUF-KPHL	>0	0	2.86	-	
KPHL-KPIT-KPHL	0	>0	3.01	-	Feasible/Select
KPHL-KADW-KPHL	0	>0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	0	>0	2.25	-	Feasible/Select
KPHL-KPIT-KPHL	>0	0	3.01	-	
KPHL-KADW-KPHL	>0	0	1.75	-	
KPHL-KORF-KPHL	>0	0	2.25	-	
KPHL-KBUF-KPIT -KPHL	>0	0	4.51	1.36	Feasible/Combine
KPHL-KBUF-KADW -KPHL	0	>0	4.30	.31	
KPHL-KBUF-KORF -KPHL	0	>0	4.87	.24	
KPHL-KPIT-KADW -KPHL	>0	0	4.23	.53	
KPHL-KPIT-KORF -KPHL	>0	0	4.71	.55	
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	
KPHL-KBUF-KPIT -KADW-KPHL	0	>0	5.72	.54	Unfeasible/Cap
KPHL-KBUF-KPIT -KORF-KPHL	0	>0	6.21	.55	Unfeasible/Cap
KPHL-KBUF-KPIT -KPHL	>0	0	4.51	1.36	Feasible/Select
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KPHL-KPIT-KPHL
KPHL-KADW-KPHL
KPHL-KORF-KPHL
KPHL-KBUF-KPIT-KPHL
KPHL-KORF-KADW-KPHL

Total Time: 14.85
Aircraft Required: 2

Applicable Days: 18, 74

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KPHL-KBUF-KPHL	>0	0	2.86	-	
KPHL-KPIT-KPHL	>0	0	3.01	-	
KPHL-KADW-KPHL	0	>0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	>0	0	2.25	-	
KPHL-KADW-KPHL	>0	0	1.75	-	
KPHL-KBUF-KPIT -KPHL	0	>0	4.51	1.36	Unfeasible/Cap
KPHL-KBUF-KADW -KPHL	>0	0	4.30	.31	Feasible/Combine
KPHL-KBUF-KORF -KPHL	0	>0	4.87	.24	
KPHL-KPIT-KADW -KPHL	0	>0	4.23	.53	Unfeasible/Cap
KPHL-KPIT-KORF -KPHL	0	>0	4.71	.55	Unfeasible/Cap
KPHL-KADW-KORF -KPHL	0	>0	3.33	.70	Unfeasible/Cap
KPHL-KBUF-KPIT -KADW-KPHL	0	>0	5.72	.54	Unfeasible/Cap
KPHL-KBUF-KADW -KORF-KPHL	0	>0	5.88	.31	Unfeasible/Cap
KPHL-KBUF-KADW -KPHL	>0	0	4.30	.31	Feasible/Select
KPHL-KPIT-KORF -KPHL	0	>0	4.71	.55	Unfeasible/Cap
KPHL-KPIT-KPHL	>0	0	3.01	-	Feasible/Select
KPHL-KORF-KPHL	>0	0	2.25	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KPHL-KPIT-KPHL
KPHL-KADW-KPHL

KPHL-KORF-KPHL
KPHL-KBUF-KADW-KPHL

Total Time: 11.31
Aircraft Required: 2

Applicable Days: 45

<u>Clarke-Wright</u> <u>Calculations</u>

Route	C	U	T	S	Remarks
KPHL-KBUF-KPHL	>0	0	2.86	-	
KPHL-KPIT-KPHL	0	>0	3.01	-	Feasible/Select
KPHL-KADW-KPHL	0	>0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	0	>0	2.25	-	Feasible/Select
KPHL-KPIT-KPHL	>0	0	3.01	-	
KPHL-KADW-KPHL	>0	0	1.75	-	
KPHL-KORF-KPHL	>0	0	2.25	-	
KPHL-KBUF-KPIT -KPHL	>0	0	4.51	1.36	Feasible/Combine
KPHL-KBUF-KADW -KPHL	0	>0	4.30	.31	
KPHL-KBUF-KORF -KPHL	0	>0	4.87	.24	
KPHL-KPIT-KADW -KPHL	>0	0	4.23	.53	
KPHL-KPIT-KORF -KPHL	>0	0	4.71	.55	
KPHL-KADW-KORF -KPHL	0	>0	3.33	.70	
KPHL-KBUF-KPIT -KADW-KPHL	0	>0	5.72	.54	Unfeasible/Cap
KPHL-KBUF-KPIT -KORF-KPHL	0	>0	6.21	.55	Unfeasible/Cap
KPHL-KBUF-KPIT -KPHL	>0	0	4.51	1.36	Feasible/Select
KPHL-KADW-KORF -KPHL	0	>0	3.33	.70	Unfeasible/Cap
KPHL-KADW-KPHL	>0	0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	>0	0	2.25	-	Feasible/Select

<u>Split</u> <u>Delivery</u> <u>Calculations</u>

** No Splits Possible **

Selected Routes

KPHL-KPIT-KPHL
KPHL-KADW-KPHL
KPHL-KADW-KPHL
KPHL-KORF-KPHL
KPHL-KORF-KPHL
KPHL-KBUF-KPIT-KPHL

Total Time: 15.52
Aircraft Required: 3

Applicable Days: 46

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KPHL-KBUF-KPHL	>0	0	2.86	-	
KPHL-KPIT-KPHL	>0	0	3.01	-	
KPHL-KADW-KPHL	0	>0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	0	>0	2.25	-	Feasible/Select
KPHL-KADW-KPHL	>0	0	1.75	-	
KPHL-KORF-KPHL	>0	0	2.25	-	
KPHL-KBUF-KPIT -KPHL	0	>0	4.51	1.36	Unfeasible/Cap
KPHL-KBUF-KADW -KPHL	>0	0	4.30	.31	
KPHL-KBUF-KORF -KPHL	>0	0	4.87	.24	
KPHL-KPIT-KADW -KPHL	0	>0	4.23	.53	
KPHL-KPIT-KORF -KPHL	0	>0	4.71	.55	
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	Feasible/Combine
KPHL-KORF-KADW -KPIT-KPHL	0	>0	5.80	.54	Unfeasible/Cap
KPHL-KORF-KADW -KBUF-KPHL	>0	0	5.88	.31	Feasible/Combine
KPHL-KORF-KADW -KPIT-KBUF	0	>0	7.30	1.59	Unfeasible/Cap
KPHL-KORF-KADW -KBUF-KPHL	>0	0	5.88	.31	Feasible/Select
KPHL-KPIT-KPHL	>0	0	3.01	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KPHL-KPIT-KPHL
KPHL-KADW-KPHL
KPHL-KORF-KPHL
KPHL-KBUF-KADW-KORF-KPHL

Total Time: 12.89
Aircraft Required: 2

Applicable Days: 47

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KPHL-KORF-KPHL	>0	0	2.25	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KPHL-KORF-KPHL

Total Time: 2.25
Aircraft Required: 1

Applicable Days: 48

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KPHL-KSYR-KPHL	>0	0	2.34	-	
KPHL-KORF-KPHL	>0	0	2.25	-	
KPHL-KSYR-KORF -KPHL	>0	0	4.54	.05	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KPHL-KORF-KSYR-KPHL

Total Time: 4.54
Aircraft Required: 1

Applicable Days: 49

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KPHL-KSYR-KPHL	>0	0	2.34	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KPHL-KSYR-KPHL

Total Time: 2.34
Aircraft Required: 1

Applicable Days: 50-55

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KPHL-KSYR-KPHL	>0	0	2.34	-	
KPHL-KBUF-KPHL	>0	0	2.86	-	
KPHL-KPIT-KPHL	>0	0	3.01	-	
KPHL-KADW-KPHL	0	>0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	0	>0	2.25	-	Feasible/Select
KPHL-KADW-KPHL	0	>0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	>0	0	2.25	-	
KPHL-KADW-KPHL	>0	0	1.75	-	
KPHL-KSYR-KBUF -KPHL	>0	0	4.15	1.07	Feasible/Combine
KPHL-KSYR-KPIT -KPHL	>0	0	4.66	.69	
KPHL-KSYR-KADW -KPHL	>0	0	3.98	.11	

KPHL-KSYR-KORF -KPHL	>0	0	4.54	.05	
KPHL-KBUF-KPIT -KPHL	0	>0	4.51	1.36	
KPHL-KBUF-KADW -KPHL	>0	0	4.30	.31	
KPHL-KBUF-KORF -KPHL	>0	0	4.87	.24	
KPHL-KPIT-KADW -KPHL	>0	0	4.23	.53	
KPHL-KPIT-KORF -KPHL	>0	0	4.71	.55	
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	
KPHL-KSYR-KBUF -KPIT-KPHL	0	>0	5.77	.90	Unfeasible/Cap
KPHL-KSYR-KBUF -KADW-KPHL	0	>0	5.57	.33	
KPHL-KSYR-KBUF -KORF-KPHL	0	>0	6.13	.27	
KPHL-KSYR-KBUF -KPHL	>0	0	3.66	1.54	Feasible/Select
KPHL-KPIT-KADW -KPHL	>0	0	4.23	.53	
KPHL-KPIT-KORF -KPHL	>0	0	4.71	.55	
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	Feasible/Combine
KPHL-KORF-KADW -KPIT-KPHL	>0	0	5.80	.54	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KPHL-KADW-KPHL
KPHL-KADW-KPHL
KPHL-KORF-KPHL
KPHL-KSYR-KBUF-KPHL
KPHL-KPIT-KADW-KORF-KPHL

Total Time: 15.21
Aircraft Required: 2

Applicable Days: 56

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KPHL-KSYR-KPHL	>0	0	2.34	-	
KPHL-KBUF-KPHL	>0	0	2.86	-	
KPHL-KPIT-KPHL	>0	0	3.01	-	
KPHL-KADW-KPHL	0	>0	1.75	-	Feasible/Select
KPHL-KORF-KPHL	0	>0	2.25	-	Feasible/Select
KPHL-KADW-KPHL	>0	0	1.75	-	
KPHL-KORF-KPHL	>0	0	2.25	-	
KPHL-KSYR-KBUF -KPHL	>0	0	4.15	1.07	
KPHL-KSYR-KPIT -KPHL	>0	0	4.66	.69	
KPHL-KSYR-KADW -KPHL	>0	0	3.98	.11	
KPHL-KSYR-KORF -KPHL	>0	0	4.54	.05	
KPHL-KBUF-KPIT -KPHL	>0	0	4.51	1.36	Feasible/Combine
KPHL-KBUF-KADW -KPHL	0	>0	4.30	.31	
KPHL-KBUF-KORF -KPHL	>0	0	4.87	.24	
KPHL-KPIT-KADW -KPHL	>0	0	4.23	.53	
KPHL-KPIT-KORF -KPHL	>0	0	4.71	.55	
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	
KPHL-KSYR-KBUF -KPIT-KPHL	>0	0	5.77	.90	Feasible/Combine
KPHL-KBUF-PIT -KORF-KPHL	>0	0	6.21	.55	
KPHL-KSYR-KBUF -KPIT-KADW-KPHL	0	>0	6.98	.54	
KPHL-KSYR-KBUF -KPIT-KORF-KPHL	>0	0	7.48	.54	
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	Feasible/Select
KPHL-KSYR-KBUF -KPIT-KPHL	>0	0	5.77	.90	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KPHL-KADW-KPHL
KPHL-KORF-KPHL
KPHL-KADW-KORF-KPHL
KPHL-KSYR-KBUF-KPIT-KPHL

Total Time: 13.10
Aircraft Required: 2

Applicable Days: 81

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KPHL-KADW-KPHL	>0	0	1.75	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KPHL-KADW-KPHL

Total Time: 1.75
Aircraft Required: 1

Applicable Days: 82

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KPHL-KADW-KPHL	>0	0	1.75	-	
KPHL-KORF-KPHL	>0	0	2.25	-	
KPHL-KADW-KORF -KPHL	>0	0	3.33	.70	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KPHL-KADW-KORF-KPHL

Total Time: 3.33
Aircraft Required: 1

Applicable Days: 83-84

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KPHL-KORF-KPHL	>0	0	2.25	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KPHL-KORF-KPHL

Total Time: 2.25
Aircraft Required: 1

Applicable Days: 19-28, 75-80

No Routes or Aircraft Required

Appendix K: Routing Calculations for the Houston Network

Ninety Day Patient Delivery Schedules

Airport: New Orleans

Day \ Category	1	2	3	4	5	6	Tot
1	7	7	71	48	2	0	135
2	7	7	71	48	2	0	135
3	7	7	71	48	2	0	135
4	7	7	71	48	2	0	135
5	7	7	71	48	2	0	135
6	7	7	71	48	2	0	135
7	7	7	71	37	2	0	124
8	7	7	71	0	2	0	87
9	7	7	71	0	2	0	87
10	7	7	71	0	2	0	87
11	7	7	71	0	2	3	90
12	7	7	71	0	2	6	93
13	7	7	71	0	2	6	93
14	7	7	71	0	2	6	93
15	7	7	71	0	2	2	89
16	7	7	71	0	2	0	87
17	7	7	71	0	2	0	87
18	7	7	64	0	2	0	80
19	7	7	0	0	2	0	16
20	7	7	0	0	2	0	16
21	7	7	0	0	2	0	16
22	7	7	0	0	2	0	16
23	7	7	0	0	2	0	16
24	7	7	0	0	2	0	16
25	7	7	0	0	2	0	16
26	7	7	0	0	2	0	16
27	7	7	0	0	2	0	16
28	7	7	0	0	2	0	16
29	7	7	71	0	2	0	87
30	7	7	71	0	2	0	87
31	7	7	71	0	2	0	87
32	7	7	71	0	2	0	87
33	7	7	71	0	2	0	87
34	7	7	71	0	2	0	87
35	7	7	71	0	2	0	87
36	7	7	71	0	2	0	87
37	7	7	71	0	2	0	87
38	7	7	71	0	2	0	87
39	7	7	71	0	2	0	87
40	7	7	71	0	2	0	87

41	7	7	71	0	2	0	87
42	7	7	71	0	2	0	87
43	7	7	71	0	2	0	87
44	7	7	71	0	2	0	87
45	7	7	71	0	2	0	87
46	7	7	64	0	2	0	80
47	7	7	0	0	2	0	16
48	7	7	0	0	2	3	19
49	7	7	0	0	2	6	22
50	7	7	0	48	2	6	70
51	7	7	0	48	2	6	70
52	7	7	0	48	2	2	66
53	7	7	0	48	2	0	64
54	7	7	0	48	2	0	64
55	7	7	0	48	2	0	64
56	7	7	0	37	2	0	53
57	7	7	71	0	2	0	87
58	7	7	71	0	2	0	87
59	7	7	71	0	2	0	87
60	7	7	71	0	2	0	87
61	7	7	71	0	2	0	87
62	7	7	71	0	2	0	87
63	7	7	71	0	2	0	87
64	7	7	71	0	2	0	87
65	7	7	71	0	2	0	87
66	7	7	71	0	2	0	87
67	7	7	71	0	2	0	87
68	7	7	71	0	2	0	87
69	7	7	71	0	2	0	87
70	7	7	71	0	2	0	87
71	7	7	71	0	2	0	87
72	7	7	71	0	2	0	87
73	7	7	71	0	2	0	87
74	7	7	64	0	2	0	80
75	7	7	0	0	2	0	16
76	7	7	0	0	2	0	16
77	7	7	0	0	2	0	16
78	7	7	0	0	2	0	16
79	7	7	0	0	2	0	16
80	7	7	0	0	2	0	16
81	7	7	0	0	2	0	16
82	7	7	0	0	2	0	16
83	7	7	0	0	2	0	16
84	7	7	0	0	2	0	16
85	7	7	71	0	2	3	90
86	7	7	71	0	2	6	93
87	7	7	71	0	2	6	93
88	7	7	71	0	2	6	93
89	7	7	71	0	2	2	89
90	7	7	71	0	2	0	87

Airport: Little Rock

Day \ Category	1	2	3	4	5	6	Tot
1	0	0	5	13	0	0	18
2	0	0	5	13	0	0	18
3	0	0	5	13	0	0	18
4	0	0	5	13	0	0	18
5	0	0	5	13	0	0	18
6	0	0	5	13	0	0	18
7	0	0	5	8	0	0	13
8	0	0	5	0	0	0	5
9	0	0	5	0	0	0	5
10	0	0	5	0	0	0	5
11	0	0	5	0	0	0	5
12	0	0	5	0	0	0	5
13	0	0	5	0	0	0	5
14	0	0	5	0	0	0	5
15	0	0	5	0	0	0	5
16	0	0	5	0	0	0	5
17	0	0	3	0	0	0	3
18	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	5	0	0	0	5
30	0	0	5	0	0	0	5
31	0	0	5	0	0	0	5
32	0	0	5	0	0	0	5
33	0	0	5	0	0	0	5
34	0	0	5	0	0	0	5
35	0	0	5	0	0	0	5
36	0	0	5	0	0	0	5
37	0	0	5	0	0	0	5
38	0	0	5	0	0	0	5
39	0	0	5	0	0	0	5
40	0	0	5	0	0	0	5
41	0	0	5	0	0	0	5
42	0	0	5	0	0	0	5
43	0	0	5	0	0	0	5
44	0	0	5	0	0	0	5
45	0	0	3	0	0	0	3
46	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0

48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	13	0	0	13
51	0	0	0	13	0	0	13
52	0	0	0	13	0	0	13
53	0	0	0	13	0	0	13
54	0	0	0	13	0	0	13
55	0	0	0	13	0	0	13
56	0	0	0	8	0	0	8
57	0	0	5	0	0	0	5
58	0	0	5	0	0	0	5
59	0	0	5	0	0	0	5
60	0	0	5	0	0	0	5
61	0	0	5	0	0	0	5
62	0	0	5	0	0	0	5
63	0	0	5	0	0	0	5
64	0	0	5	0	0	0	5
65	0	0	5	0	0	0	5
66	0	0	5	0	0	0	5
67	0	0	5	0	0	0	5
68	0	0	5	0	0	0	5
69	0	0	5	0	0	0	5
70	0	0	5	0	0	0	5
71	0	0	5	0	0	0	5
72	0	0	5	0	0	0	5
73	0	0	3	0	0	0	3
74	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	5	0	0	0	5
86	0	0	5	0	0	0	5
87	0	0	5	0	0	0	5
88	0	0	5	0	0	0	5
89	0	0	5	0	0	0	5
90	0	0	5	0	0	0	5

Airport: Shreveport

Day	Category	1	2	3	4	5	6	Tot
1		0	0	6	4	0	0	10
2		0	0	6	4	0	0	10
3		0	0	6	4	0	0	10

4	0	0	6	4	0	0	10
5	0	0	6	4	0	0	10
6	0	0	6	4	0	0	10
7	0	0	6	8	0	0	14
8	0	0	6	0	0	0	6
9	0	0	6	0	0	0	6
10	0	0	6	0	0	0	6
11	0	0	6	0	0	0	6
12	0	0	6	0	0	0	6
13	0	0	6	0	0	0	6
14	0	0	6	0	0	0	6
15	0	0	6	0	0	4	10
16	0	0	6	0	0	0	6
17	0	0	6	0	0	0	6
18	0	0	4	0	0	0	4
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	6	0	0	0	6
30	0	0	6	0	0	0	6
31	0	0	6	0	0	0	6
32	0	0	6	0	0	0	6
33	0	0	6	0	0	0	6
34	0	0	6	0	0	0	6
35	0	0	6	0	0	0	6
36	0	0	6	0	0	0	6
37	0	0	6	0	0	0	6
38	0	0	6	0	0	0	6
39	0	0	6	0	0	0	6
40	0	0	6	0	0	0	6
41	0	0	6	0	0	0	6
42	0	0	6	0	0	0	6
43	0	0	6	0	0	0	6
44	0	0	6	0	0	0	6
45	0	0	6	0	0	0	6
46	0	0	4	0	0	0	4
47	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	4	0	0	4
51	0	0	0	4	0	0	4
52	0	0	0	4	0	4	8
53	0	0	0	4	0	0	4
54	0	0	0	4	0	0	4

55	0	0	0	4	0	0	4
56	0	0	0	8	0	0	8
57	0	0	6	0	0	0	6
58	0	0	6	0	0	0	6
59	0	0	6	0	0	0	6
60	0	0	6	0	0	0	6
61	0	0	6	0	0	0	6
62	0	0	6	0	0	0	6
63	0	0	6	0	0	0	6
64	0	0	6	0	0	0	6
65	0	0	6	0	0	0	6
66	0	0	6	0	0	0	6
67	0	0	6	0	0	0	6
68	0	0	6	0	0	0	6
69	0	0	6	0	0	0	6
70	0	0	6	0	0	0	6
71	0	0	6	0	0	0	6
72	0	0	6	0	0	0	6
73	0	0	6	0	0	0	6
74	0	0	4	0	0	0	4
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	6	0	0	0	6
86	0	0	6	0	0	0	6
87	0	0	6	0	0	0	6
88	0	0	6	0	0	0	6
89	0	0	6	0	0	4	10
90	0	0	6	0	0	0	6

Airport: Oklahoma City

Category	1	2	3	4	5	6	Tot
Day							
1	0	0	24	18	0	0	42
2	0	0	24	18	0	0	42
3	0	0	24	18	0	0	42
4	0	0	24	18	0	0	42
5	0	0	24	18	0	0	42
6	0	0	24	18	0	0	42
7	0	0	24	12	0	0	36
8	0	0	24	0	0	0	24
9	0	0	24	0	0	0	24
10	0	0	24	0	0	0	24

11	0	0	24	0	0	0	24
12	0	0	24	0	0	0	24
13	0	0	24	0	0	0	24
14	0	0	24	0	0	0	24
15	0	0	24	0	0	0	24
16	0	0	24	0	0	0	24
17	0	0	24	0	0	0	24
18	0	0	14	0	0	0	14
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	24	0	0	0	24
30	0	0	24	0	0	0	24
31	0	0	24	0	0	0	24
32	0	0	24	0	0	0	24
33	0	0	24	0	0	0	24
34	0	0	24	0	0	0	24
35	0	0	24	0	0	0	24
36	0	0	24	0	0	0	24
37	0	0	24	0	0	0	24
38	0	0	24	0	0	0	24
39	0	0	24	0	0	0	24
40	0	0	24	0	0	0	24
41	0	0	24	0	0	0	24
42	0	0	24	0	0	0	24
43	0	0	24	0	0	0	24
44	0	0	24	0	0	0	24
45	0	0	24	0	0	0	24
46	0	0	14	0	0	0	14
47	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	18	0	0	18
51	0	0	0	18	0	0	18
52	0	0	0	18	0	0	18
53	0	0	0	18	0	0	18
54	0	0	0	18	0	0	18
55	0	0	0	18	0	0	18
56	0	0	0	12	0	0	12
57	0	0	24	0	0	0	24
58	0	0	24	0	0	0	24
59	0	0	24	0	0	0	24
60	0	0	24	0	0	0	24
61	0	0	24	0	0	0	24

62	0	0	24	0	0	0	24
63	0	0	24	0	0	0	24
64	0	0	24	0	0	0	24
65	0	0	24	0	0	0	24
66	0	0	24	0	0	0	24
67	0	0	24	0	0	0	24
68	0	0	24	0	0	0	24
69	0	0	24	0	0	0	24
70	0	0	24	0	0	0	24
71	0	0	24	0	0	0	24
72	0	0	24	0	0	0	24
73	0	0	24	0	0	0	24
74	0	0	14	0	0	0	14
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	24	0	0	0	24
86	0	0	24	0	0	0	24
87	0	0	24	0	0	0	24
88	0	0	24	0	0	0	24
89	0	0	24	0	0	0	24
90	0	0	24	0	0	0	24

Airport: Carswell AFB

Category	1	2	3	4	5	6	Tot
Day							
1	0	0	28	25	0	0	53
2	0	0	28	25	0	0	53
3	0	0	28	25	0	0	53
4	0	0	28	25	0	0	53
5	0	0	28	25	0	0	53
6	0	0	28	25	0	0	53
7	0	0	28	24	0	0	52
8	0	0	28	0	0	0	28
9	0	0	28	0	0	0	28
10	0	0	28	0	0	0	28
11	0	0	28	0	0	0	28
12	0	0	28	0	0	0	28
13	0	0	28	0	0	0	28
14	0	0	28	0	0	0	28
15	0	0	28	0	0	0	28
16	0	0	28	0	0	0	28
17	0	0	28	0	0	0	28

18	0	0	26	0	0	0	26
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	28	0	0	0	28
30	0	0	28	0	0	0	28
31	0	0	28	0	0	0	28
32	0	0	28	0	0	0	28
33	0	0	28	0	0	0	28
34	0	0	28	0	0	0	28
35	0	0	28	0	0	0	28
36	0	0	28	0	0	0	28
37	0	0	28	0	0	0	28
38	0	0	28	0	0	0	28
39	0	0	28	0	0	0	28
40	0	0	28	0	0	0	28
41	0	0	28	0	0	0	28
42	0	0	28	0	0	0	28
43	0	0	28	0	0	0	28
44	0	0	28	0	0	0	28
45	0	0	28	0	0	0	28
46	0	0	26	0	0	0	26
47	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	25	0	0	25
51	0	0	0	25	0	0	25
52	0	0	0	25	0	0	25
53	0	0	0	25	0	0	25
54	0	0	0	25	0	0	25
55	0	0	0	25	0	0	25
56	0	0	0	24	0	0	24
57	0	0	28	0	0	0	28
58	0	0	28	0	0	0	28
59	0	0	28	0	0	0	28
60	0	0	28	0	0	0	28
61	0	0	28	0	0	0	28
62	0	0	28	0	0	0	28
63	0	0	28	0	0	0	28
64	0	0	28	0	0	0	28
65	0	0	28	0	0	0	28
66	0	0	28	0	0	0	28
67	0	0	28	0	0	0	28
68	0	0	28	0	0	0	28

69	0	0	28	0	0	0	28
70	0	0	28	0	0	0	28
71	0	0	28	0	0	0	28
72	0	0	28	0	0	0	28
73	0	0	28	0	0	0	28
74	0	0	26	0	0	0	26
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	28	0	0	0	28
86	0	0	28	0	0	0	28
87	0	0	28	0	0	0	28
88	0	0	28	0	0	0	28
89	0	0	28	0	0	0	28
90	0	0	28	0	0	0	28

Airport: San Antonio

Day	*Category* 1	2	3	4	5	6	Tot
1	0	0	24	20	0	6	50
2	0	0	24	20	0	6	50
3	0	0	24	20	0	6	50
4	0	0	24	20	0	6	50
5	0	0	24	20	0	6	50
6	0	0	24	20	0	5	49
7	0	0	24	18	0	0	42
8	0	0	24	0	0	0	24
9	0	0	24	0	0	0	24
10	0	0	24	0	0	0	24
11	0	0	24	0	0	0	24
12	0	0	24	0	0	0	24
13	0	0	24	0	0	0	24
14	0	0	24	0	0	0	24
15	0	0	24	0	0	0	24
16	0	0	24	0	0	0	24
17	0	0	24	0	0	0	24
18	0	0	20	0	0	0	20
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0

25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	24	0	0	0	24
30	0	0	24	0	0	0	24
31	0	0	24	0	0	0	24
32	0	0	24	0	0	0	24
33	0	0	24	0	0	0	24
34	0	0	24	0	0	0	24
35	0	0	24	0	0	0	24
36	0	0	24	0	0	0	24
37	0	0	24	0	0	0	24
38	0	0	24	0	0	6	30
39	0	0	24	0	0	6	30
40	0	0	24	0	0	6	30
41	0	0	24	0	0	6	30
42	0	0	24	0	0	6	30
43	0	0	24	0	0	5	29
44	0	0	24	0	0	0	24
45	0	0	24	0	0	0	24
46	0	0	20	0	0	0	20
47	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	20	0	0	20
51	0	0	0	20	0	0	20
52	0	0	0	20	0	0	20
53	0	0	0	20	0	0	20
54	0	0	0	20	0	0	20
55	0	0	0	20	0	0	20
56	0	0	0	18	0	0	18
57	0	0	24	0	0	0	24
58	0	0	24	0	0	0	24
59	0	0	24	0	0	0	24
60	0	0	24	0	0	0	24
61	0	0	24	0	0	0	24
62	0	0	24	0	0	0	24
63	0	0	24	0	0	0	24
64	0	0	24	0	0	0	24
65	0	0	24	0	0	0	24
66	0	0	24	0	0	0	24
67	0	0	24	0	0	0	24
68	0	0	24	0	0	0	24
69	0	0	24	0	0	0	24
70	0	0	24	0	0	0	24
71	0	0	24	0	0	0	24
72	0	0	24	0	0	0	24
73	0	0	24	0	0	0	24
74	0	0	20	0	0	0	20
75	0	0	0	0	0	6	6

76	0	0	0	0	0	6	6
77	0	0	0	0	0	6	6
78	0	0	0	0	0	6	6
79	0	0	0	0	0	6	6
80	0	0	0	0	0	5	5
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	24	0	0	0	24
86	0	0	24	0	0	0	24
87	0	0	24	0	0	0	24
88	0	0	24	0	0	0	24
89	0	0	24	0	0	0	24
90	0	0	24	0	0	0	24

Heuristic Calculations

Applicable Days: 1-6

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KEFD-KSKF-KEFD	0	>0	2.31	-	Feasible/Select
KEFD-KMSY-KEFD	0	>0	2.95	-	Feasible/Select
KEFD-KBAD-KEFD	>0	0	2.36	-	
KEFD-KFWH-KEFD	0	>0	2.51	-	Feasible/Select
KEFD-KLRF-KEFD	>0	0	3.40	-	
KEFD-KOKC-KEFD	>0	0	3.51	-	
KEFD-KSKF-KEFD	>0	0	2.31	-	
KEFD-KMSY-KEFD	0	>0	2.95	-	Feasible/Select
KEFD-KFWH-KEFD	>0	0	2.51	-	
KEFD-KMSY-KEFD	>0	0	2.95	-	
KEFD-KSKF-KFWH -KEFD	>0	0	4.09	.73	
KEFD-KSKF-KOKC -KEFD	>0	0	5.13	.69	
KEFD-KSKF-KLRF -KEFD	>0	0	5.50	.21	
KEFD-KSKF-KBAD -KEFD	>0	0	4.50	.17	
KEFD-KSKF-KMSY -KEFD	>0	0	5.26	0	
KEFD-KFWH-KOKC -KEFD	>0	0	4.57	1.45	Feasible/Combine

KEFD-KFWH-KLRF -KEFD	>0	0	5.07	.84	
KEFD-KFWH-KBAD -KEFD	>0	0	4.21	.66	
KEFD-KFWH-KMSY -KEFD	>0	0	5.22	.24	
KEFD-KOKC-KLRF -KEFD	0	>0	5.49	1.42	
KEFD-KOKC-KBAD -KEFD	0	>0	4.90	.97	
KEFD-KOKC-KMSY -KEFD	0	>0	5.98	.48	
KEFD-KLRF-KBAD -KEFD	>0	0	4.40	1.36	
KEFD-KLRF-KMSY -KEFD	0	>0	5.16	1.19	
KEFD-KBAD-KMSY -KEFD	0	>0	4.44	.87	
KEFD-KSKF-KFWH -KOKC-KEFD	0	>0	6.15	.73	Unfeasible/Cap
KEFD-KFWH-KOKC -KLRF-KEFD	0	>0	6.56	1.41	Unfeasible/Cap
KEFD-KFWH-KOKC -KBAD-KEFD	0	>0	5.97	.96	Unfeasible/Cap
KEFD-KFWH-KOKC -KMSY-KEFD	0	>0	7.04	.48	Unfeasible/Cap
KEFD-KSKF-KLRF -KEFD	>0	0	5.50	.21	
KEFD-KSKF-KBAD -KEFD	>0	0	4.50	.17	
KEFD-KSKF-KMSY -KEFD	>0	0	5.26	0	
KEFD-KFWH-KOKC -KEFD	>0	0	4.57	1.45	Feasible/Select
KEFD-KLRF-KBAD -KEFD	>0	0	4.40	1.36	Feasible/Combine
KEFD-KLRF-KMSY -KEFD	0	>0	5.16	1.19	
KEFD-KBAD-KMSY -KEFD	0	>0	4.44	.87	
KEFD-KSKF-KLRF -KBAD-KEFD	>0	0	6.50	.21	Feasible/Combine
KEFD-KLRF-KBAD -KMSY-KEFD	0	>0	6.48	.87	Unfeasible/Cap
KEFD-KSKF-KLRF -KBAD-KMSY-KEFD	0	>0	8.58	.87	Unfeasible/Cap

KEFD-KSKF-KLRF -KBAD-KEFD	>0	0	6.50	.21	Feasible/Select
KEFD-KMSY-KEFD	>0	0	2.95	-	Feasible/Select

Split Delivery Calculations

Route	C	U	T	S	Remarks
KEFD-KFWH-KOKC -KBAD-KEFD + KEFD-KMSY-KBAD -KEFD	0	0	15.91	-1.89	No Savings

Selected Routes

KEFD-KMSY-KEFD
KEFD-KMSY-KEFD
KEFD-KMSY-KEFD
KEFD-KSKF-KEFD
KEFD-KFWH-KEFD
KEFD-KFWH-KOKC-KEFD
KEFD-KSKF-KLRF-KBAD-KEFD

Total Time: 24.74
Aircraft Required: 4

Applicable Days: 7

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KEFD-KSKF-KEFD	>0	0	2.31	-	
KEFD-KMSY-KEFD	0	>0	2.95	-	Feasible/Select
KEFD-KBAD-KEFD	>0	0	2.36	-	
KEFD-KFWH-KEFD	0	>0	2.51	-	Feasible/Select
KEFD-KLRF-KEFD	>0	0	3.40	-	
KEFD-KOKC-KEFD	>0	0	3.51	-	
KEFD-KMSY-KEFD	0	>0	2.95	-	Feasible/Select
KEFD-KFWH-KEFD	>0	0	2.51	-	
KEFD-KMSY-KEFD	>0	0	2.95	-	
KEFD-KSKF-KFWH -KEFD	>0	0	4.09	.73	
KEFD-KSKF-KOKC -KEFD	0	>0	5.13	.69	

KEFD-KSKF-KLRF -KEFD	0	>0	5.50	.21	
KEFD-KSKF-KBAD -KEFD	0	>0	4.50	.17	
KEFD-KSKF-KMSY -KEFD	0	>0	5.26	0	
KEFD-KFWH-KOKC -KEFD	>0	0	4.57	1.45	Feasible/Combine
KEFD-KFWH-KLRF -KEFD	>0	0	5.07	.84	
KEFD-KFWH-KBAD -KEFD	>0	0	4.21	.66	
KEFD-KFWH-KMSY -KEFD	>0	0	5.22	.24	
KEFD-KOKC-KLRF -KEFD	0	>0	5.49	1.42	
KEFD-KOKC-KBAD -KEFD	0	>0	4.90	.97	
KEFD-KOKC-KMSY -KEFD	0	>0	5.98	.48	
KEFD-KLRF-KBAD -KEFD	>0	0	4.40	1.36	
KEFD-KLRF-KMSY -KEFD	>0	0	5.16	1.19	
KEFD-KBAD-KMSY -KEFD	>0	0	4.44	.87	
KEFD-KSKF-KFWH -KOKC-KEFD	0	>0	6.15	.73	Unfeasible/Cap
KEFD-KFWH-KOKC -KLRF-KEFD	0	>0	6.56	1.41	Unfeasible/Cap
KEFD-KFWH-KOKC -KBAD-KEFD	0	>0	5.97	.96	Unfeasible/Cap
KEFD-KFWH-KOKC -KMSY-KEFD	0	>0	7.04	.48	Unfeasible/Cap
KEFD-KSKF-KLRF -KEFD	0	>0	5.50	.21	
KEFD-KSKF-KBAD -KEFD	0	>0	4.50	.17	
KEFD-KSKF-KMSY -KEFD	0	>0	5.26	0	
KEFD-KFWH-KOKC -KEFD	>0	0	4.57	1.45	Feasible/Select
KEFD-KLRF-KBAD -KEFD	>0	0	4.40	1.36	Feasible/Combine
KEFD-KLRF-KMSY -KEFD	>0	0	5.16	1.19	
KEFD-KBAD-KMSY -KEFD	>0	0	4.44	.87	

KEFD-KSKF-KLRF -KBAD-KEFD	0	>0	6.50	.21	Unfeasible/Cap
KEFD-KLRF-KBAD -KMSY-KEFD	0	>0	6.48	.87	Unfeasible/Cap
KEFD-KSKF-KMSY -KEFD	0	>0	5.26	0	Unfeasible/Cap
KEFD-KLRF-KBAD -KEFD	>0	0	4.40	1.36	Feasible/Select
KEFD-KSKF-KEFD	>0	0	2.31	-	Feasible/Select
KEFD-KMSY-KEFD	>0	0	2.95	-	Feasible/Select

Split Delivery Calculations

Route	C	U	T	S	Remarks
KEFD-KSKF-KFWH -KEFD + KEFD -KFWH-KLRF-KBAD -KEFD	>0	0	10.16	-2.39	No Savings
KEFD-KFWH-KOKC -KLRF-KEFD + KEFD-KMSY-KLRF -KEFD	>0	0	11.72	-2.16	No Savings
KEFD-KFWH-KOKC -KBAD-KEFD + KEFD-KMSY-KBAD -KEFD	>0	0	10.41	-1.89	No Savings

Selected Routes

KEFD-KMSY-KEFD
KEFD-KMSY-KEFD
KEFD-KMSY-KEFD
KEFD-KSKF-KEFD
KEFD-KFWH-KEFD
KEFD-KFWH-KOKC-KEFD
KEFD-KLRF-KBAD-KEFD

Total Time: 18.11
Aircraft Required: 3

Applicable Days: 8-17, 29-45, 57-73, 85-90

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KEFD-KSKF-KEFD	>0	0	2.31	-	
KEFD-KMSY-KEFD	0	>0	2.95	-	Feasible/Select
KEFD-KBAD-KEFD	>0	0	2.36	-	
KEFD-KFWH-KEFD	>0	0	2.51	-	
KEFD-KLRF-KEFD	>0	0	3.40	-	
KEFD-KOKC-KEFD	>0	0	3.51	-	
KEFD-KMSY-KEFD	>0	0	2.95	-	
KEFD-KSKF-KFWH -KEFD	0	>0	4.09	.73	
KEFD-KSKF-KOKC -KEFD	0	>0	5.13	.69	
KEFD-KSKF-KLRF -KEFD	>0	0	5.50	.21	
KEFD-KSKF-KBAD -KEFD	>0	0	4.50	.17	
KEFD-KSKF-KMSY -KEFD	0	>0	5.26	0	
KEFD-KFWH-KOKC -KEFD	0	>0	4.57	1.45	Unfeasible/Cap
KEFD-KFWH-KLRF -KEFD	>0	0	5.07	.84	
KEFD-KFWH-KBAD -KEFD	>0	0	4.21	.66	
KEFD-KFWH-KMSY -KEFD	0	>0	5.22	.24	
KEFD-KOKC-KLRF -KEFD	>0	0	5.49	1.42	Feasible/Combine
KEFD-KOKC-KBAD -KEFD	>0	0	4.90	.97	
KEFD-KOKC-KMSY -KEFD	0	>0	5.98	.48	
KEFD-KLRF-KBAD -KEFD	>0	0	4.40	1.36	
KEFD-KLRF-KMSY -KEFD	>0	0	5.16	1.19	
KEFD-KBAD-KMSY -KEFD	>0	0	4.44	.87	
KEFD-KOKC-KLRF -KBAD-KEFD	>0	0	6.49	1.36	Feasible/Combine
KEFD-KOKC-KLRF -KMSY-KEFD	0	>0	7.25	1.19	

KEFD-KSKD-KOKC -KLRF-KEFD	0	>0	7.12	.68	
KEFD-KFWH-KOKC -KLRF-KEFD	0	>0	6.57	1.43	Unfeasible/Cap
KEFD-KOKC-KLRF -KBAD-KMSY-KEFD	0	>0	8.57	.87	Unfeasible/Cap
KEFD-KSKF-KOKC -KLRF-KBAD-KEFD	0	>0	8.12	.68	Unfeasible/Cap
KEFD-KFWH-KOKC -KLRF-KBAD-KEFD	0	>0	7.55	1.45	Unfeasible/Cap
KEFD-KOKC-KLRF -KBAD-KEFD	>0	0	6.49	1.36	Feasible/Select
KEFD-KSKF-KFWH -KEFD	0	>0	4.09	.73	Unfeasible/Cap
KEFD-KSKF-KMSY -KEFD	0	>0	5.26	0	Unfeasible/Cap
KEFD-KFWH-KMSY -KEFD	0	>0	5.22	.24	Unfeasible/Cap
KEFD-KSKF-KEFD	>0	0	2.31	-	Feasible/Select
KEFD-KFWH-KEFD	>0	0	2.51	-	Feasible/Select
KEFD-KMSY-KEFD	>0	0	2.95	-	Feasible/Select

Split Delivery Calculations

Route	C	U	T	S	Remarks
KEFD-KSKF-KFWH -KEFD + KEFD -KFWH-KOKC-KLRF -KBAD-KEFD	0	0	11.64	-.33	No Savings
KEFD-KSKF-KFWH -KEFD + KEFD -KFWH-KMSY-KEFD	0	0	9.31	-1.54	No Savings

Selected Routes

KEFD-KMSY-KEFD
KEFD-KMSY-KEFD
KEFD-KSKF-KEFD
KEFD-KFWH-KEFD
KEFD-KOKC-KLRF-KBAD-KEFD

Total Time: 17.21
Aircraft Required: 3

Applicable Days: 18, 46, 74

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KEFD-KSKF-KEFD	>0	0	2.31	-	
KEFD-KMSY-KEFD	0	>0	2.95	-	Feasible/Select
KEFD-KBAD-KEFD	>0	0	2.36	-	
KEFD-KFWH-KEFD	>0	0	2.51	-	
KEFD-KOKC-KEFD	>0	0	3.51	-	
KEFD-KMSY-KEFD	>0	0	2.95	-	
KEFD-KSKF-KFWH -KEFD	>0	0	4.09	.73	
KEFD-KSKF-KOKC -KEFD	>0	0	5.13	.69	
KEFD-KSKF-KBAD -KEFD	>0	0	4.50	.17	
KEFD-KSKF-KMSY -KEFD	0	>0	5.26	0	
KEFD-KFWH-KOKC -KEFD	>0	0	4.57	1.45	Feasible/Combine
KEFD-KFWH-KBAD -KEFD	>0	0	4.21	.66	
KEFD-KFWH-KMSY -KEFD	0	>0	5.22	.24	
KEFD-KOKC-KBAD -KEFD	>0	0	4.90	.97	
KEFD-KOKC-KMSY -KEFD	>0	0	5.98	.48	
KEFD-KBAD-KMSY -KEFD	>0	0	4.44	.87	
KEFD-KSKF-KFWH -KOKC-KEFD	0	>0	6.15	.73	
KEFD-KFWH-KOKC -KBAD-KEFD	>0	0	5.97	.96	Feasible/Combine
KEFD-KFWH-KOKC -KMSY-KEFD	0	>0	7.04	.48	
KEFD-KSKF-KFWH -KOKC-KBAD-KEFD	0	>0	7.55	.55	Unfeasible/Cap
KEFD-KFWH-KOKC -KBAD-KMSY-KEFD	0	>0	8.04	.88	Unfeasible/Cap
KEFD-KFWH-KOKC -KBAD-KEFD	>0	0	5.97	.96	Feasible/Select

KEFD-KSKF-KMSY -KEFD	0	>0	5.26	0	Unfeasible/Cap
KEFD-KSKF-KEFD	>0	0	2.31	-	Feasible/Select
KEFD-KMSY-KEFD	>0	0	2.95	-	Feasible/Select

<u>Split Delivery Calculations</u>

Route	C	U	T	S	Remarks
KEFD-KSKF-KFWH -KEFD + KEFD -KMSY-KFWH-KEFD	>0	0	9.31	-2.98	No Savings
KEFD-KSKF-KOKC -KEFD + KEFD -KMSY-KOKC-KEFD	>0	0	11.11	-4.95	No Savings
KEFD-KSKF-KBAD -KEFD + KEFD -KMSY-KBAD-KEFD	>0	0	8.94	-2.28	No Savings

<u>Selected Routes</u>

KEFD-KMSY-KEFD
KEFD-KMSY-KEFD
KEFD-KSKF-KEFD
KEFD-KFWH-KOKC-KBAD-KEFD

Total Time: 14.18
Aircraft Required: 2

Applicable Days: 19-28, 47-49, 81-84

<u>Clarke-Wright Calculations</u>

Route	C	U	T	S	Remarks
KEFD-KMSY-KEFD	>0	0	2.95	-	Feasible/Select

<u>Split Delivery Calculations</u>

** No Splits Possible **

<u>Selected Routes</u>

KEFD-KMSY-KEFD

Total Time: 2.95
Aircraft Required: 1

Applicable Days: 50-51, 53-55

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KEFD-KSKF-KEFD	>0	0	2.31	-	
KEFD-KMSY-KEFD	0	>0	2.95	-	Feasible/Select
KEFD-KBAD-KEFD	>0	0	2.36	-	
KEFD-KFWH-KEFD	>0	0	2.51	-	
KEFD-KLRF-KEFD	>0	0	3.40	-	
KEFD-KOKC-KEFD	>0	0	3.51	-	
KEFD-KMSY-KEFD	>0	0	2.95	-	
KEFD-KSKF-KFWH -KEFD	>0	0	4.09	.73	
KEFD-KSKF-KOKC -KEFD	>0	0	5.13	.69	
KEFD-KSKF-KLRF -KEFD	>0	0	5.50	.21	
KEFD-KSKF-KBAD -KEFD	>0	0	4.50	.17	
KEFD-KSKF-KMSY -KEFD	>0	0	5.26	0	
KEFD-KFWH-KOKC -KEFD	>0	0	4.57	1.45	Feasible/Combine
KEFD-KFWH-KLRF -KEFD	>0	0	5.07	.84	
KEFD-KFWH-KBAD -KEFD	>0	0	4.21	.66	
KEFD-KFWH-KMSY -KEFD	>0	0	5.22	.24	
KEFD-KOKC-KLRF -KEFD	>0	0	5.49	1.42	
KEFD-KOKC-KBAD -KEFD	>0	0	4.90	.97	
KEFD-KOKC-KMSY -KEFD	>0	0	5.98	.48	
KEFD-KLRF-KBAD -KEFD	>0	0	4.40	1.36	
KEFD-KLRF-KMSY -KEFD	>0	0	5.16	1.19	
KEFD-KBAD-KMSY -KEFD	>0	0	4.44	.87	
KEFD-KSKF-KFWH -KOKC-KEFD	0	>0	6.15	.73	
KEFD-KFWH-KOKC -KLRF-KEFD	0	>0	6.56	1.41	Unfeasible/Cap

KEFD-KFWH-KOKC -KBAD-KEFD	>0	0	5.97	.96	
KEFD-KFWH-KOKC -KMSY-KEFD	0	>0	7.04	.48	
KEFD-KSKF-KLRF -KEFD	>0	0	5.50	.21	
KEFD-KSKF-KBAD -KEFD	>0	0	4.50	.17	
KEFD-KSKF-KMSY -KEFD	>0	0	5.26	0	
KEFD-KSKF-KLRF -KEFD	>0	0	5.50	.21	
KEFD-KSKF-KMSY -KEFD	>0	0	5.26	0	
KEFD-KLRF-KBAD -KEFD	>0	0	4.40	1.36	Feasible/Combine
KEFD-KLRF-KMSY -KEFD	>0	0	5.16	1.19	
KEFD-KBAD-KMSY -KEFD	>0	0	4.44	.87	
KEFD-KLRF-KBAD -KMSY-KEFD	>0	0	6.48	1.36	Feasible/Select
KEFD-KSKF-KLRF -KBAD-KEFD	>0	0	6.50	.25	
KEFD-KFWH-KOKC -KEFD	>0	0	4.57	1.45	Feasible/Select
KEFD-KSKF-KEFD	>0	0	2.31	-	Feasible Select

<u>Split Delivery Calculations</u>

Route	C	U	T	S	Remarks
KEFD-KMSY-KBAD -KLRF-KFWH-KEFD + KEFD-KSKF -KFWH-KSKF	>0	0	12.24	-2.21	No Savings
KEFD-KMSY-KBAD -KLRF-KOKC-KEFD +KEFD-KSKF -KOKC-KEFD	>0	0	13.70	-2.67	No Savings

<u>Selected Routes</u>

KEFD-KMSY-KEFD
KEFD-KSKF-KEFD
KEFD-KFWH-KOKC-KEFD

KEFD-KLRF-KBAD-KMSY-KEFD

Total Time: 16.31
Aircraft Required: 2

Applicable Days: 52

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KEFD-KSKF-KEFD	>0	0	2.31	-	
KEFD-KMSY-KEFD	0	>0	2.95	-	Feasible/Select
KEFD-KBAD-KEFD	>0	0	2.36	-	
KEFD-KFWH-KEFD	>0	0	2.51	-	
KEFD-KLRF-KEFD	>0	0	3.40	-	
KEFD-KOKC-KEFD	>0	0	3.51	-	
KEFD-KMSY-KEFD	>0	0	2.95	-	
KEFD-KSKF-KFWH -KEFD	>0	0	4.09	.73	
KEFD-KSKF-KOKC -KEFD	>0	0	5.13	.69	
KEFD-KSKF-KLRF -KEFD	>0	0	5.50	.21	
KEFD-KSKF-KBAD -KEFD	>0	0	4.50	.17	
KEFD-KSKF-KMSY -KEFD	>0	0	5.26	0	
KEFD-KFWH-KOKC -KEFD	>0	0	4.57	1.45	Feasible/Combine
KEFD-KFWH-KLRF -KEFD	>0	0	5.07	.84	
KEFD-KFWH-KBAD -KEFD	>0	0	4.21	.66	
KEFD-KFWH-KMSY -KEFD	>0	0	5.22	.24	
KEFD-KOKC-KLRF -KEFD	>0	0	5.49	1.42	
KEFD-KOKC-KBAD -KEFD	>0	0	4.90	.97	
KEFD-KOKC-KMSY -KEFD	>0	0	5.98	.48	
KEFD-KLRF-KBAD -KEFD	>0	0	4.40	1.36	
KEFD-KLRF-KMSY -KEFD	>0	0	5.16	1.19	
KEFD-KBAD-KMSY -KEFD	>0	0	4.44	.87	

KEFD-KSKF-KFWH -KOKC-KEFD	0	>0	6.15	.73	Unfeasible/Cap
KEFD-KFWH-KOKC -KLRF-KEFD	0	>0	6.56	1.41	Unfeasible/Cap
KEFD-KFWH-KOKC -KBAD-KEFD	0	>0	5.97	.96	Unfeasible/Cap
KEFD-KFWH-KOKC -KMSY-KEFD	0	>0	7.04	.48	Unfeasible/Cap
KEFD-KSKF-KLRF -KEFD	>0	0	5.50	.21	
KEFD-KSKF-KBAD -KEFD	>0	0	4.50	.17	
KEFD-KSKF-KMSY -KEFD	>0	0	5.26	0	
KEFD-KFWH-KOKC -KEFD	>0	0	4.57	1.45	Feasible/Select
KEFD-KLRF-KBAD -KEFD	>0	0	4.40	1.36	Feasible/Combine
KEFD-KLRF-KMSY -KEFD	>0	0	5.16	1.19	
KEFD-KBAD-KMSY -KEFD	>0	0	4.44	.87	
KEFD-KSKF-KLRF -KBAD-KEFD	0	>0	6.50	.25	Unfeasible/Cap
KEFD-KLRF-KBAD -KMSY-KEFD	>0	0	6.48	1.36	Feasible/Select
KEFD-KSKF-KEFD	>0	0	2.31	-	Feasible/Select

<u>Split Delivery Calculations</u>

Route	C	U	T	S	Remarks
KEFD-KMSY-KBAD -KLRF-KFWH-KEFD + KEFD-KSKF -KFWH-KSKF	>0	0	12.24	-2.21	No Savings
KEFD-KMSY-KBAD -KLRF-KOKC-KEFD +KEFD-KSKF -KOKC-KEFD	>0	0	13.70	-2.67	No Savings

<u>Selected Routes</u>

KEFD-KMSY-KEFD
KEFD-KSKF-KEFD
KEFD-KFWH-KOKC-KEFD
KEFD-KMSY-KBAD-KLRF-KEFD

Total Time: 16.31
Aircraft Required: 2

Applicable Days: 56

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KEFD-KSKF-KEFD	>0	0	2.31	-	
KEFD-KMSY-KEFD	0	>0	2.95	-	Feasible/Select
KEFD-KBAD-KEFD	>0	0	2.36	-	
KEFD-KFWH-KEFD	>0	0	2.51	-	
KEFD-KLRF-KEFD	>0	0	3.40	-	
KEFD-KOKC-KEFD	>0	0	3.51	-	
KEFD-KMSY-KEFD	>0	0	2.95	-	
KEFD-KSKF-KFWH -KEFD	>0	0	4.09	.73	
KEFD-KSKF-KOKC -KEFD	>0	0	5.13	.69	
KEFD-KSKF-KLRF -KEFD	>0	0	5.50	.21	
KEFD-KSKF-KBAD -KEFD	>0	0	4.50	.17	
KEFD-KSKF-KMSY -KEFD	>0	0	5.26	0	
KEFD-KFWH-KOKC -KEFD	>0	0	4.57	1.45	Feasible/Combine
KEFD-KFWH-KLRF -KEFD	>0	0	5.07	.84	
KEFD-KFWH-KBAD -KEFD	>0	0	4.21	.66	
KEFD-KFWH-KMSY -KEFD	>0	0	5.22	.24	
KEFD-KOKC-KLRF -KEFD	>0	0	5.49	1.42	
KEFD-KOKC-KBAD -KEFD	>0	0	4.90	.97	
KEFD-KOKC-KMSY -KEFD	>0	0	5.98	.48	
KEFD-KLRF-KBAD -KEFD	>0	0	4.40	1.36	
KEFD-KLRF-KMSY -KEFD	>0	0	5.16	1.19	
KEFD-KBAD-KMSY -KEFD	>0	0	4.44	.87	

KEFD-KSKF-KFWH -KOKC-KEFD	0	>0	6.15	.73	
KEFD-KFWH-KOKC -KLRF-KEFD	>0	0	6.56	1.41	Feasible/Combine
KEFD-KFWH-KOKC -KBAD-KEFD	>0	0	5.97	.96	
KEFD-KFWH-KOKC -KMSY-KEFD	>0	0	7.04	.48	
KEFD-KFWH-KOKC -KLRF-KBAD-KEFD	0	>0	7.56	1.36	Unfeasible/Cap
KEFD-KFWH-KOKC -KLRF-KMSY-KEFD	0	>0	8.32	1.19	Unfeasible/Cap
KEFD-KSKF-KFWH -KOKC-KLRF-KEFD	0	>0	8.14	.73	Unfeasible/Cap
KEFD-KFWH-KOKC -KLRF-KEFD	>0	0	6.56	1.41	Feasible/Select
KEFD-KSKF-KBAD -KEFD	>0	0	4.50	.17	
KEFD-KSKF-KMSY -KEFD	>0	0	5.26	0	
KEFD-KBAD-KMSY -KEFD	>0	0	4.44	.87	Feasible/Combine
KEFD-KSKF-KBAD -KMSY-KEFD	>0	0	6.58	.97	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KEFD-KMSY-KEFD
KEFD-KSKF-KBAD-KMSY-KEFD
KEFD-KFWH-KOKC-KLRF-KEFD

Total Time: 16.09
Aircraft Required: 2

Applicable Days: 75-80

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KEFD-KSKF-KEFD	>0	0	2.31	-	
KEFD-KMSY-KEFD	>0	0	2.95	-	

KEFD-KSKF-KMSY -KEFD	>0	0	5.26	0	Feasible/Select

<u>Split Delivery Calculations</u>

** No Splits Possible **

<u>Selected Routes</u>

KEFD-KMSY-KSKF-KEFD

Total Time: 5.26
Aircraft Required: 1

Appendix L: Routing Calculations for the Atlanta Network

Ninety Day Patient Delivery Schedules

Airport: Homestead

Day \ Category	1	2	3	4	5	6	Tot
1	0	0	5	0	0	0	5
2	0	0	5	0	0	0	5
3	0	0	5	0	0	0	5
4	0	0	5	0	0	0	5
5	0	0	5	0	0	0	5
6	0	0	5	0	0	0	5
7	0	0	5	0	0	0	5
8	0	0	5	0	0	0	5
9	0	0	5	0	0	0	5
10	0	0	5	0	0	0	5
11	0	0	5	0	0	0	5
12	0	0	5	0	0	0	5
13	0	0	5	0	0	0	5
14	0	0	5	0	0	0	5
15	0	0	5	0	0	0	5
16	0	0	5	0	0	0	5
17	0	0	2	0	0	0	2
18	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	5	0	0	0	5
30	0	0	5	0	0	0	5
31	0	0	5	0	0	0	5
32	0	0	5	0	0	0	5
33	0	0	5	0	0	0	5
34	0	0	5	0	0	0	5
35	0	0	5	0	0	0	5
36	0	0	5	0	0	0	5
37	0	0	5	0	0	0	5
38	0	0	5	0	0	0	5
39	0	0	5	0	0	0	5
40	0	0	5	0	0	0	5

41	0	0	5	0	0	0	5
42	0	0	5	0	0	0	5
43	0	0	5	0	0	0	5
44	0	0	5	0	0	0	5
45	0	0	2	0	0	0	2
46	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0
51	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0
57	0	0	5	0	0	0	5
58	0	0	5	0	0	0	5
59	0	0	5	0	0	0	5
60	0	0	5	0	0	0	5
61	0	0	5	0	0	0	5
62	0	0	5	0	0	0	5
63	0	0	5	0	0	0	5
64	0	0	5	0	0	0	5
65	0	0	5	0	0	0	5
66	0	0	5	0	0	0	5
67	0	0	5	0	0	0	5
68	0	0	5	0	0	0	5
69	0	0	5	0	0	0	5
70	0	0	5	0	0	0	5
71	0	0	5	0	0	0	5
72	0	0	5	0	0	0	5
73	0	0	2	0	0	0	2
74	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	5	0	0	0	5
86	0	0	5	0	0	0	5
87	0	0	5	0	0	0	5
88	0	0	5	0	0	0	5
89	0	0	5	0	0	0	5
90	0	0	5	0	0	0	5

Airport: Birmingham

Day	Category 1	2	3	4	5	6	Tot
1	0	0	28	8	0	0	36
2	0	0	28	8	0	0	36
3	0	0	28	8	0	0	36
4	0	0	28	8	0	0	36
5	0	0	28	8	0	0	36
6	0	0	28	8	0	0	36
7	0	0	28	8	0	0	36
8	0	0	28	0	0	0	28
9	0	0	28	0	0	0	28
10	0	0	28	0	0	0	28
11	0	0	28	0	0	0	28
12	0	0	28	0	0	0	28
13	0	0	28	0	0	9	37
14	0	0	28	0	0	0	28
15	0	0	28	0	0	0	28
16	0	0	28	0	0	0	28
17	0	0	28	0	0	0	28
18	0	0	11	0	0	0	11
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	28	0	0	0	28
30	0	0	28	0	0	0	28
31	0	0	28	0	0	0	28
32	0	0	28	0	0	0	28
33	0	0	28	0	0	0	28
34	0	0	28	0	0	0	28
35	0	0	28	0	0	0	28
36	0	0	28	0	0	0	28
37	0	0	28	0	0	0	28
38	0	0	28	0	0	0	28
39	0	0	28	0	0	0	28
40	0	0	28	0	0	0	28
41	0	0	28	0	0	0	28
42	0	0	28	0	0	0	28
43	0	0	28	0	0	0	28
44	0	0	28	0	0	0	28
45	0	0	28	0	0	0	28
46	0	0	11	0	0	0	11
47	0	0	0	0	0	0	0

48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	8	0	9	17
51	0	0	0	8	0	0	8
52	0	0	0	8	0	0	8
53	0	0	0	8	0	0	8
54	0	0	0	8	0	0	8
55	0	0	0	8	0	0	8
56	0	0	0	8	0	0	8
57	0	0	28	0	0	0	28
58	0	0	28	0	0	0	28
59	0	0	28	0	0	0	28
60	0	0	28	0	0	0	28
61	0	0	28	0	0	0	28
62	0	0	28	0	0	0	28
63	0	0	28	0	0	0	28
64	0	0	28	0	0	0	28
65	0	0	28	0	0	0	28
66	0	0	28	0	0	0	28
67	0	0	28	0	0	0	28
68	0	0	28	0	0	0	28
69	0	0	28	0	0	0	28
70	0	0	28	0	0	0	28
71	0	0	28	0	0	0	28
72	0	0	28	0	0	0	28
73	0	0	28	0	0	0	28
74	0	0	11	0	0	0	11
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	28	0	0	0	28
86	0	0	28	0	0	0	28
87	0	0	28	0	0	9	37
88	0	0	28	0	0	0	28
89	0	0	28	0	0	0	28
90	0	0	28	0	0	0	28

Airport: Orlando

Day \ Category	1	2	3	4	5	6	Tot
1	13	0	40	30	2	0	85
2	13	0	40	30	2	0	85
3	13	0	40	30	2	0	85
4	13	0	40	30	2	0	85
5	13	0	40	30	2	0	85
6	13	0	40	30	2	0	85
7	13	0	40	21	2	0	76
8	13	0	40	0	2	4	59
9	13	0	40	0	2	12	67
10	13	0	40	0	2	12	67
11	13	0	40	0	2	12	67
12	13	0	40	0	2	10	65
13	13	0	40	0	2	0	55
14	13	0	40	0	2	0	55
15	13	0	40	0	2	0	55
16	13	0	40	0	2	0	55
17	13	0	40	0	2	0	55
18	13	0	22	0	2	0	37
19	13	0	0	0	2	0	15
20	13	0	0	0	2	0	15
21	13	0	0	0	2	0	15
22	13	0	0	0	2	0	15
23	13	0	0	0	2	0	15
24	13	0	0	0	2	0	15
25	13	0	0	0	2	0	15
26	13	0	0	0	2	0	15
27	13	0	0	0	2	0	15
28	13	0	0	0	2	0	15
29	13	0	40	0	0	0	53
30	13	0	40	0	0	0	53
31	13	0	40	0	0	0	53
32	13	0	40	0	0	0	53
33	13	0	40	0	0	0	53
34	13	0	40	0	2	0	55
35	13	0	40	0	2	0	55
36	13	0	40	0	2	0	55
37	13	0	40	0	2	0	55
38	13	0	40	0	2	0	55
39	13	0	40	0	2	0	55
40	13	0	40	0	2	0	55
41	13	0	40	0	2	0	55
42	13	0	40	0	2	0	55
43	13	0	40	0	2	0	55
44	13	0	40	0	2	0	55
45	13	0	40	0	2	4	59
46	13	0	22	0	2	12	49
47	13	0	0	0	2	12	27

48	13	0	0	0	2	12	27
49	13	0	0	0	2	10	25
50	13	0	0	30	2	0	45
51	13	0	0	30	2	0	45
52	13	0	0	30	2	0	45
53	13	0	0	30	2	0	45
54	13	0	0	30	2	0	45
55	13	0	0	30	2	0	45
56	13	0	0	21	2	0	36
57	13	0	40	0	2	0	55
58	13	0	40	0	2	0	55
59	13	0	40	0	2	0	55
60	13	0	40	0	2	0	55
61	13	0	40	0	2	0	55
62	13	0	40	0	0	0	53
63	13	0	40	0	0	0	53
64	13	0	40	0	0	0	53
65	13	0	40	0	0	0	53
66	13	0	40	0	0	0	53
67	13	0	40	0	2	0	55
68	13	0	40	0	2	0	55
69	13	0	40	0	2	0	55
70	13	0	40	0	2	0	55
71	13	0	40	0	2	0	55
72	13	0	40	0	2	0	55
73	13	0	40	0	2	0	55
74	13	0	22	0	2	0	37
75	13	0	0	0	2	0	15
76	13	0	0	0	2	0	15
77	13	0	0	0	2	0	15
78	13	0	0	0	2	0	15
79	13	0	0	0	2	0	15
80	13	0	0	0	2	0	15
81	13	0	0	0	2	0	15
82	13	0	0	0	2	4	19
83	13	0	0	0	2	12	27
84	13	0	0	0	2	12	27
85	13	0	40	0	2	12	67
86	13	0	40	0	2	10	65
87	13	0	40	0	2	0	55
88	13	0	40	0	2	0	55
89	13	0	40	0	2	0	55
90	13	0	40	0	2	0	55

Airport: Jacksonville

Day	Category 1	2	3	4	5	6	Tot
1	0	5	22	52	0	0	79
2	0	5	22	52	0	0	79
3	0	5	22	52	0	1	80
4	0	5	22	52	0	12	91
5	0	5	22	52	0	12	91
6	0	5	22	52	0	12	91
7	0	5	22	43	0	12	82
8	0	5	22	0	0	8	35
9	0	5	22	0	0	0	27
10	0	5	22	0	0	0	27
11	0	5	22	0	0	0	27
12	0	5	22	0	0	0	27
13	0	5	22	0	0	0	27
14	0	5	22	0	0	0	27
15	0	5	22	0	0	0	27
16	0	5	22	0	0	0	27
17	0	5	22	0	0	0	27
18	0	5	19	0	0	0	24
19	0	5	0	0	0	0	5
20	0	5	0	0	0	0	5
21	0	5	0	0	0	0	5
22	0	5	0	0	0	0	5
23	0	5	0	0	0	0	5
24	0	5	0	0	0	0	5
25	0	5	0	0	0	0	5
26	0	5	0	0	0	0	5
27	0	5	0	0	0	0	5
28	0	5	0	0	0	0	5
29	0	5	22	0	2	0	29
30	0	5	22	0	2	0	29
31	0	5	22	0	2	0	29
32	0	5	22	0	2	0	29
33	0	5	22	0	2	0	29
34	0	5	22	0	0	0	27
35	0	5	22	0	0	0	27
36	0	5	22	0	0	0	27
37	0	5	22	0	0	0	27
38	0	5	22	0	0	0	27
39	0	5	22	0	0	0	27
40	0	5	22	0	0	1	28
41	0	5	22	0	0	12	39
42	0	5	22	0	0	12	39
43	0	5	22	0	0	12	39
44	0	5	22	0	0	12	39
45	0	5	22	0	0	8	35
46	0	5	19	0	0	0	24
47	0	5	0	0	0	0	5

48	0	5	0	0	0	0	5
49	0	5	0	0	0	0	5
50	0	5	0	52	0	0	57
51	0	5	0	52	0	0	57
52	0	5	0	52	0	0	57
53	0	5	0	52	0	0	57
54	0	5	0	52	0	0	57
55	0	5	0	52	0	0	57
56	0	5	0	43	0	0	48
57	0	5	22	0	0	0	27
58	0	5	22	0	0	0	27
59	0	5	22	0	0	0	27
60	0	5	22	0	0	0	27
61	0	5	22	0	0	0	27
62	0	5	22	0	2	0	29
63	0	5	22	0	2	0	29
64	0	5	22	0	2	0	29
65	0	5	22	0	2	0	29
66	0	5	22	0	2	0	29
67	0	5	22	0	0	0	27
68	0	5	22	0	0	0	27
69	0	5	22	0	0	0	27
70	0	5	22	0	0	0	27
71	0	5	22	0	0	0	27
72	0	5	22	0	0	0	27
73	0	5	22	0	0	0	27
74	0	5	19	0	0	0	24
75	0	5	0	0	0	0	5
76	0	5	0	0	0	0	5
77	0	5	0	0	0	1	6
78	0	5	0	0	0	12	17
79	0	5	0	0	0	12	17
80	0	5	0	0	0	12	17
81	0	5	0	0	0	12	17
82	0	5	0	0	0	8	13
83	0	5	0	0	0	0	5
84	0	5	0	0	0	0	5
85	0	5	22	0	0	0	27
86	0	5	22	0	0	0	27
87	0	5	22	0	0	0	27
88	0	5	22	0	0	0	27
89	0	5	22	0	0	0	27
90	0	5	22	0	0	0	27

Airport: Jackson

Day	Category 1	2	3	4	5	6	Tot
1	0	0	18	3	0	0	21
2	0	0	18	3	0	0	21
3	0	0	18	3	0	0	21
4	0	0	18	3	0	0	21
5	0	0	18	3	0	0	21
6	0	0	18	3	0	0	21
7	0	0	18	5	0	0	23
8	0	0	18	0	0	0	18
9	0	0	18	0	0	0	18
10	0	0	18	0	0	0	18
11	0	0	18	0	0	0	18
12	0	0	18	0	0	0	18
13	0	0	18	0	0	0	18
14	0	0	18	0	0	8	26
15	0	0	18	0	0	0	18
16	0	0	18	0	0	0	18
17	0	0	18	0	0	0	18
18	0	0	9	0	0	0	9
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	18	0	0	0	18
30	0	0	18	0	0	0	18
31	0	0	18	0	0	0	18
32	0	0	18	0	0	0	18
33	0	0	18	0	0	0	18
34	0	0	18	0	0	0	18
35	0	0	18	0	0	0	18
36	0	0	18	0	0	0	18
37	0	0	18	0	0	0	18
38	0	0	18	0	0	0	18
39	0	0	18	0	0	0	18
40	0	0	18	0	0	0	18
41	0	0	18	0	0	0	18
42	0	0	18	0	0	0	18
43	0	0	18	0	0	0	18
44	0	0	18	0	0	0	18
45	0	0	18	0	0	0	18
46	0	0	9	0	0	0	9
47	0	0	0	0	0	0	0

48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	3	0	0	3
51	0	0	0	3	0	8	11
52	0	0	0	3	0	0	3
53	0	0	0	3	0	0	3
54	0	0	0	3	0	0	3
55	0	0	0	3	0	0	3
56	0	0	0	5	0	0	5
57	0	0	18	0	0	0	18
58	0	0	18	0	0	0	18
59	0	0	18	0	0	0	18
60	0	0	18	0	0	0	18
61	0	0	18	0	0	0	18
62	0	0	18	0	0	0	18
63	0	0	18	0	0	0	18
64	0	0	18	0	0	0	18
65	0	0	18	0	0	0	18
66	0	0	18	0	0	0	18
67	0	0	18	0	0	0	18
68	0	0	18	0	0	0	18
69	0	0	18	0	0	0	18
70	0	0	18	0	0	0	18
71	0	0	18	0	0	0	18
72	0	0	18	0	0	0	18
73	0	0	18	0	0	0	18
74	0	0	9	0	0	0	9
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	18	0	0	0	18
86	0	0	18	0	0	0	18
87	0	0	18	0	0	0	18
88	0	0	18	0	0	8	26
89	0	0	18	0	0	0	18
90	0	0	18	0	0	0	18

Airport: Millington

Day	Category 1	2	3	4	5	6	Tot
1	0	0	14	9	0	0	23
2	0	0	14	9	0	0	23
3	0	0	14	9	0	0	23
4	0	0	14	9	0	0	23
5	0	0	14	9	0	0	23
6	0	0	14	9	0	0	23
7	0	0	14	5	0	0	19
8	0	0	14	0	0	0	14
9	0	0	14	0	0	0	14
10	0	0	14	0	0	0	14
11	0	0	14	0	0	0	14
12	0	0	14	0	0	0	14
13	0	0	14	0	0	0	14
14	0	0	14	0	0	4	18
15	0	0	14	0	0	0	14
16	0	0	14	0	0	0	14
17	0	0	14	0	0	0	14
18	0	0	10	0	0	0	10
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	14	0	0	0	14
30	0	0	14	0	0	0	14
31	0	0	14	0	0	0	14
32	0	0	14	0	0	0	14
33	0	0	14	0	0	0	14
34	0	0	14	0	0	0	14
35	0	0	14	0	0	0	14
36	0	0	14	0	0	0	14
37	0	0	14	0	0	0	14
38	0	0	14	0	0	0	14
39	0	0	14	0	0	0	14
40	0	0	14	0	0	0	14
41	0	0	14	0	0	0	14
42	0	0	14	0	0	0	14
43	0	0	14	0	0	0	14
44	0	0	14	0	0	0	14
45	0	0	14	0	0	0	14
46	0	0	10	0	0	0	10
47	0	0	0	0	0	0	0

48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	9	0	0	9
51	0	0	0	9	0	4	13
52	0	0	0	9	0	0	9
53	0	0	0	9	0	0	9
54	0	0	0	9	0	0	9
55	0	0	0	9	0	0	9
56	0	0	0	5	0	0	5
57	0	0	14	0	0	0	14
58	0	0	14	0	0	0	14
59	0	0	14	0	0	0	14
60	0	0	14	0	0	0	14
61	0	0	14	0	0	0	14
62	0	0	14	0	0	0	14
63	0	0	14	0	0	0	14
64	0	0	14	0	0	0	14
65	0	0	14	0	0	0	14
66	0	0	14	0	0	0	14
67	0	0	14	0	0	0	14
68	0	0	14	0	0	0	14
69	0	0	14	0	0	0	14
70	0	0	14	0	0	0	14
71	0	0	14	0	0	0	14
72	0	0	14	0	0	0	14
73	0	0	14	0	0	0	14
74	0	0	10	0	0	0	10
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	14	0	0	0	14
86	0	0	14	0	0	0	14
87	0	0	14	0	0	0	14
88	0	0	14	0	0	4	18
89	0	0	14	0	0	0	14
90	0	0	14	0	0	0	14

Airport: Knoxville

Day	Category 1	2	3	4	5	6	Tot
1	0	0	12	9	0	0	21
2	0	0	12	9	0	0	21
3	0	0	12	9	0	0	21
4	0	0	12	9	0	0	21
5	0	0	12	9	0	0	21
6	0	0	12	9	0	0	21
7	0	0	12	10	0	0	22
8	0	0	12	0	0	0	12
9	0	0	12	0	0	0	12
10	0	0	12	0	0	0	12
11	0	0	12	0	0	0	12
12	0	0	12	0	0	0	12
13	0	0	12	0	0	0	12
14	0	0	12	0	0	0	12
15	0	0	12	0	0	1	13
16	0	0	12	0	0	0	12
17	0	0	12	0	0	0	12
18	0	0	5	0	0	0	5
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	12	0	0	0	12
30	0	0	12	0	0	0	12
31	0	0	12	0	0	0	12
32	0	0	12	0	0	0	12
33	0	0	12	0	0	0	12
34	0	0	12	0	0	0	12
35	0	0	12	0	0	0	12
36	0	0	12	0	0	0	12
37	0	0	12	0	0	0	12
38	0	0	12	0	0	0	12
39	0	0	12	0	0	0	12
40	0	0	12	0	0	0	12
41	0	0	12	0	0	0	12
42	0	0	12	0	0	0	12
43	0	0	12	0	0	0	12
44	0	0	12	0	0	0	12
45	0	0	12	0	0	0	12
46	0	0	5	0	0	0	5
47	0	0	0	0	0	0	0

48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	9	0	0	9
51	0	0	0	9	0	0	9
52	0	0	0	9	0	1	10
53	0	0	0	9	0	0	9
54	0	0	0	9	0	0	9
55	0	0	0	9	0	0	9
56	0	0	0	10	0	0	10
57	0	0	12	0	0	0	12
58	0	0	12	0	0	0	12
59	0	0	12	0	0	0	12
60	0	0	12	0	0	0	12
61	0	0	12	0	0	0	12
62	0	0	12	0	0	0	12
63	0	0	12	0	0	0	12
64	0	0	12	0	0	0	12
65	0	0	12	0	0	0	12
66	0	0	12	0	0	0	12
67	0	0	12	0	0	0	12
68	0	0	12	0	0	0	12
69	0	0	12	0	0	0	12
70	0	0	12	0	0	0	12
71	0	0	12	0	0	0	12
72	0	0	12	0	0	0	12
73	0	0	12	0	0	0	12
74	0	0	5	0	0	0	5
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	12	0	0	0	12
86	0	0	12	0	0	0	12
87	0	0	12	0	0	0	12
88	0	0	12	0	0	0	12
89	0	0	12	0	0	1	13
90	0	0	12	0	0	0	12

Airport: Nashville

Day	Category	1	2	3	4	5	6	Tot
1		0	6	28	24	0	0	58
2		0	6	28	24	0	0	58
3		0	6	28	24	0	0	58
4		0	6	28	24	0	0	58
5		0	6	28	24	0	0	58
6		0	6	28	24	0	0	58
7		0	6	28	17	0	0	51
8		0	6	28	0	0	0	34
9		0	6	28	0	0	0	34
10		0	6	28	0	0	0	34
11		0	6	28	0	0	0	34
12		0	6	28	0	0	2	36
13		0	6	28	0	0	3	37
14		0	6	28	0	0	0	34
15		0	6	28	0	0	0	34
16		0	6	28	0	0	0	34
17		0	6	28	0	0	0	34
18		0	6	14	0	0	0	20
19		0	6	0	0	0	0	6
20		0	6	0	0	0	0	6
21		0	6	0	0	0	0	6
22		0	6	0	0	0	0	6
23		0	6	0	0	0	0	6
24		0	6	0	0	0	0	6
25		0	6	0	0	0	0	6
26		0	6	0	0	0	0	6
27		0	6	0	0	0	0	6
28		0	6	0	0	0	0	6
29		0	6	28	0	0	0	34
30		0	6	28	0	0	0	34
31		0	6	28	0	0	0	34
32		0	6	28	0	0	0	34
33		0	6	28	0	0	0	34
34		0	6	28	0	0	0	34
35		0	6	28	0	0	0	34
36		0	6	28	0	0	0	34
37		0	6	28	0	0	0	34
38		0	6	28	0	0	0	34
39		0	6	28	0	0	0	34
40		0	6	28	0	0	0	34
41		0	6	28	0	0	0	34
42		0	6	28	0	0	0	34
43		0	6	28	0	0	0	34
44		0	6	28	0	0	0	34
45		0	6	28	0	0	0	34
46		0	6	14	0	0	0	20
47		0	6	0	0	0	0	6

48	0	6	0	0	0	0	6
49	0	6	0	0	0	2	8
50	0	6	0	24	0	3	27
51	0	6	0	24	0	0	30
52	0	6	0	24	0	0	30
53	0	6	0	24	0	0	30
54	0	6	0	24	0	0	30
55	0	6	0	24	0	0	30
56	0	6	0	17	0	0	23
57	0	6	28	0	0	0	34
58	0	6	28	0	0	0	34
59	0	6	28	0	0	0	34
60	0	6	28	0	0	0	34
61	0	6	28	0	0	0	34
62	0	6	28	0	0	0	34
63	0	6	28	0	0	0	34
64	0	6	28	0	0	0	34
65	0	6	28	0	0	0	34
66	0	6	28	0	0	0	34
67	0	6	28	0	0	0	34
68	0	6	28	0	0	0	34
69	0	6	28	0	0	0	34
70	0	6	28	0	0	0	34
71	0	6	28	0	0	0	34
72	0	6	28	0	0	0	34
73	0	6	28	0	0	0	34
74	0	6	14	0	0	0	20
75	0	6	0	0	0	0	6
76	0	6	0	0	0	0	6
77	0	6	0	0	0	0	6
78	0	6	0	0	0	0	6
79	0	6	0	0	0	0	6
80	0	6	0	0	0	0	6
81	0	6	0	0	0	0	6
82	0	6	0	0	0	0	6
83	0	6	0	0	0	0	6
84	0	6	0	0	0	0	6
85	0	6	28	0	0	0	34
86	0	6	28	0	0	2	36
87	0	6	28	0	0	3	37
88	0	6	28	0	0	0	34
89	0	6	28	0	0	0	34
90	0	6	28	0	0	0	34

Heuristic Calculations

Applicable Days: 1-6

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KATL-KMCO-KATL	0	>0	3.43	-	Feasible/Select
KATL-KJAX-KATL	0	>0	2.67	-	Feasible/Select
KATL-KBNA-KATL	0	>0	2.35	-	Feasible/Select
KATL-KHST-KATL	>0	0	4.74	-	
KATL-KTSY-KATL	>0	0	1.89	-	
KATL-KBHM-KATL	>0	0	1.93	-	
KATL-KJAN-KATL	>0	0	3.33	-	
KATL-KNQA-KATL	>0	0	3.29	-	
KATL-KMCO-KATL	>0	0	3.43	-	
KATL-KJAX-KATL	>0	0	2.67	-	
KATL-KBNA-KATL	>0	0	2.35	-	
KATL-KMCO-KHST -KATL	>0	0	5.75	2.42	Feasible/Combine
KATL-KMCO-KJAX -KATL	0	>0	4.47	1.54	
KATL-KMCO-KTSY -KATL	0	>0	5.23	.09	
KATL-KMCO-KBNA -KATL	>0	0	5.77	.01	
KATL-KMCO-KNQA -KATL	0	>0	6.56	.16	
KATL-KMCO-KJAN -KATL	0	>0	6.29	.47	
KATL-KMCO-KBHM -KATL	0	>0	5.18	.18	
KATL-KHST-KJAX -KATL	>0	0	5.78	1.63	
KATL-KHST-KTSY -KATL	>0	0	6.55	.08	
KATL-KHST-KBNA -KATL	>0	0	7.01	.08	
KATL-KHST-KNQA -KATL	>0	0	7.80	.23	
KATL-KHST-KJAN -KATL	>0	0	7.45	.62	
KATL-KHST-KBHM -KATL	>0	0	6.45	.22	
KATL-KJAX-KTSY -KATL	0	>0	4.44	.12	
KATL-KJAX-KBNA -KATL	>0	0	5.01	.01	

KATL-KJAX-KNQA -KATL	0	>0	5.88	.08	
KATL-KJAX-KJAN -KATL	0	>0	5.71	.29	
KATL-KJAX-KBHM -KATL	0	>0	4.49	.11	
KATL-KTSY-KBNA -KATL	>0	0	3.77	.47	
KATL-KTSY-KNQA -KATL	>0	0	4.77	.41	
KATL-KTSY-KJAN -KATL	>0	0	5.01	.21	
KATL-KTSY-KBHM -KATL	0	>0	3.62	.20	
KATL-KBNA-KNQA -KATL	>0	0	4.47	1.17	
KATL-KBNA-KJAN -KATL	>0	0	4.86	.82	
KATL-KBNA-KBHM -KATL	>0	0	3.65	.63	
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	
KATL-KNQA-KBHM -KATL	0	>0	4.33	.89	
KATL-KJAN-KBHM -KATL	0	>0	4.34	.92	
KATL-KMCO-KHST -KJAX-KATL	0	>0	6.79	1.63	Unfeasible/Cap
KATL-KMCO-KHST -KTSY-KATL	0	>0	7.56	.08	Unfeasible/Cap
KATL-KMCO-KHST -KBNA-KATL	0	>0	8.07	.03	Unfeasible/Cap
KATL-KMCO-KHST -KNQA-KATL	0	>0	8.81	.23	Unfeasible/Cap
KATL-KMCO-KHST -KJAN-KATL	0	>0	8.61	.47	Unfeasible/Cap
KATL-KMCO-KHST -KBHM-KATL	0	>0	7.50	.18	Unfeasible/Cap
KATL-KMCO-KHST -KATL	>0	0	5.75	2.42	Feasible/Select
KATL-KJAX-KTSY -KATL	0	>0	4.44	.12	
KATL-KJAX-KBNA -KATL	>0	0	5.01	.01	
KATL-KJAX-KNQA -KATL	0	>0	5.88	.08	
KATL-KJAX-KJAN -KATL	0	>0	5.71	.29	

KATL-KJAX-KBHM -KATL	0	>0	4.49	.11	
KATL-KTSY-KBNA -KATL	>0	0	3.77	.47	
KATL-KTSY-KNQA -KATL	>0	0	4.77	.41	
KATL-KTSY-KJAN -KATL	>0	0	5.01	.21	
KATL-KTSY-KBHM -KATL	0	>0	3.62	.20	
KATL-KBNA-KNQA -KATL	>0	0	4.47	1.17	
KATL-KBNA-KJAN -KATL	>0	0	4.86	.82	
KATL-KBNA-KBHM -KATL	>0	0	3.65	.63	
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	Feasible/Combine
KATL-KNQA-KBHM -KATL	0	>0	4.33	.89	
KATL-KJAN-KBHM -KATL	0	>0	4.34	.92	
KATL-KJAN-KNQA -KBNA-KATL	0	>0	6.10	1.17	Unfeasible/Cap
KATL-KJAN-KNQA -KTSY-KATL	0	>0	6.40	.41	Unfeasible/Cap
KATL-KJAN-KNQA -KBHM-KATL	0	>0	5.93	.92	Unfeasible/Cap
KATL-KJAX-KTSY -KATL	0	>0	4.44	.12	
KATL-KJAX-KBNA -KATL	>0	0	5.01	.01	
KATL-KJAX-KBHM -KATL	0	>0	4.49	.11	
KATL-KTSY-KBNA -KATL	>0	0	3.77	.47	
KATL-KTSY-KBHM -KATL	0	>0	3.62	.20	
KATL-KBNA-KBHM -KATL	>0	0	3.65	.63	Feasible/Combine
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	Feasible/Select
KATL-KBHM-KBNA -KTSY-KATL	0	>0	4.97	.57	Unfeasible/Cap
KATL-KBHM-KBNA -KJAX-KATL	0	>0	6.32	0	Unfeasible/Cap
KATL-KJAX-KTSY -KATL	0	>0	4.44	.12	Unfeasible/Cap

KATL-KBNA-KBHM -KATL	>0	0	3.65	.63	Feasible/Select
KATL-KJAX-KATL	>0	0	2.67	-	Feasible/Select
KATL-KTSY-KATL	>0	0	1.89	-	Feasible/Select

<u>Split Delivery Calculations</u>

Route	C	U	T	S	Remarks
KATL-KMCO-KHST -KJAX-KATL + KATL-KTSY-KJAX -KATL	>0	0	11.20	-.89	No Savings
KATL-KBHM-KBNA -KTSY-KATL + KATL-KJAX-KTSY -KATL	>0	0	9.41	-1.20	No Savings
KATL-KJAN-KNQA -KBNA-KATL + KATL-KTSY-KBNA -KATL	>0	0	11.80	-1.34	No Savings

<u>Selected Routes</u>

KATL-KMCO-KATL
KATL-KBNA-KATL
KATL-KJAX-KATL
KATL-KJAX-KATL
KATL-KTSY-KATL
KATL-KMCO-KHST-KATL
KATL-KJAN-KNQA-KATL
KATL-KBHM-KBNA-KATL

Total Time: 27.33
Aircraft Required: 4

Applicable Days: 7

<u>Clarke-Wright Calculations</u>

Route	C	U	T	S	Remarks
KATL-KMCO-KATL	0	>0	3.43	-	Feasible/Select
KATL-KJAX-KATL	0	>0	2.67	-	Feasible/Select
KATL-KBNA-KATL	0	>0	2.35	-	Feasible/Select
KATL-KHST-KATL	>0	0	4.74	-	
KATL-KTSY-KATL	>0	0	1.89	-	

KATL-KBHM-KATL	>0	0	1.93	-	
KATL-KJAN-KATL	>0	0	3.33	-	
KATL-KNQA-KATL	>0	0	3.29	-	
KATL-KMCO-KATL	>0	0	3.43	-	
KATL-KJAX-KATL	>0	0	2.67	-	
KATL-KBNA-KATL	>0	0	2.35	-	
KATL-KMCO-KHST -KATL	>0	0	5.75	2.42	Feasible/Combine
KATL-KMCO-KJAX -KATL	0	>0	4.47	1.54	
KATL-KMCO-KTSY -KATL	0	>0	5.23	.09	
KATL-KMCO-KBNA -KATL	>0	0	5.77	.01	
KATL-KMCO-KNQA -KATL	>0	0	6.56	.16	
KATL-KMCO-KJAN -KATL	0	>0	6.29	.47	
KATL-KMCO-KBHM -KATL	0	>0	5.18	.18	
KATL-KHST-KJAX -KATL	>0	0	5.78	1.63	
KATL-KHST-KTSY -KATL	>0	0	6.55	.08	
KATL-KHST-KBNA -KATL	>0	0	7.01	.08	
KATL-KHST-KNQA -KATL	>0	0	7.80	.23	
KATL-KHST-KJAN -KATL	>0	0	7.45	.62	
KATL-KHST-KBHM -KATL	>0	0	6.45	.22	
KATL-KJAX-KTSY -KATL	0	>0	4.44	.12	
KATL-KJAX-KBNA -KATL	>0	0	5.01	.01	
KATL-KJAX-KNQA -KATL	0	>0	5.88	.08	
KATL-KJAX-KJAN -KATL	0	>0	5.71	.29	
KATL-KJAX-KBHM -KATL	0	>0	4.49	.11	
KATL-KTSY-KBNA -KATL	>0	0	3.77	.47	
KATL-KTSY-KNQA -KATL	>0	0	4.77	.41	
KATL-KTSY-KJAN -KATL	>0	0	5.01	.21	

KATL-KTSY-KBHM -KATL	0	>0	3.62	.20	
KATL-KBNA-KNQA -KATL	>0	0	4.47	1.17	
KATL-KBNA-KJAN -KATL	>0	0	4.86	.82	
KATL-KBNA-KBHM -KATL	>0	0	3.65	.63	
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	
KATL-KNQA-KBHM -KATL	0	>0	4.33	.89	
KATL-KJAN-KBHM -KATL	0	>0	4.34	.92	
KATL-KMCO-KHST -KJAX-KATL	0	>0	6.79	1.63	Unfeasible/Cap
KATL-KMCO-KHST -KTSY-KATL	0	>0	7.56	.08	Unfeasible/Cap
KATL-KMCO-KHST -KBNA-KATL	>0	0	8.07	.03	Feasible/Select
KATL-KMCO-KHST -KNQA-KATL	0	>0	8.81	.23	Unfeasible/Cap
KATL-KMCO-KHST -KJAN-KATL	0	>0	8.61	.47	Unfeasible/Cap
KATL-KMCO-KHST -KBHM-KATL	0	>0	7.50	.18	Unfeasible/Cap
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	Feasible/Combine
KATL-KJAN-KNQA -KTSY-KATL	0	>0	6.40	.41	Unfeasible/Cap
KATL-KJAN-KNQA -KBNA-KATL	>0	0	6.10	1.17	Feasible/Select
KATL-KJAX-KTSY -KATL	0	>0	4.44	.12	Unfeasible/Cap
KATL-KJAX-KBHM -KATL	0	>0	4.49	.11	Unfeasible/Cap
KATL-KTSY-KBHM -KATL	0	>0	3.62	.20	Unfeasible/Cap
KATL-KJAX-KATL	>0	0	2.67	-	Feasible/Select
KATL-KTSY-KATL	>0	0	1.89	-	Feasible/Select
KATL-KBHM-KATL	>0	0	1.93	-	Feasible/Select

Split Delivery Calculations

Route	C	U	T	S	Remarks
KATL-KBHM-KTSY -KATL + KATL -KJAX-KYSY-KATL	0	0	8.06	-1.57	No Savings

Selected Routes

KATL-KMCO-KATL
KATL-KBNA-KATL
KATL-KTSY-KATL
KATL-KBMH-KATL
KATL-KJAX-KATL
KATL-KJAX-KATL
KATL-KJAN-KNQA-KBNA-KATL
KATL-KMCO-KHST-KATL

Total Time: 26.79
Aircraft Required: 4

Applicable Days: 8, 41-44, 85

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KATL-KMCO-KATL	0	>0	3.43	-	Feasible/Select
KATL-KJAX-KATL	>0	0	2.67	-	
KATL-KBNA-KATL	>0	0	2.35	-	
KATL-KHST-KATL	>0	0	4.74	-	
KATL-KTSY-KATL	>0	0	1.89	-	
KATL-KBHM-KATL	>0	0	1.93	-	
KATL-KJAN-KATL	>0	0	3.33	-	
KATL-KNQA-KATL	>0	0	3.29	-	
KATL-KMCO-KATL	>0	0	3.43	-	
KATL-KMCO-KHST -KATL	>0	0	5.75	2.42	Feasible/Combine
KATL-KMCO-KJAX -KATL	>0	0	4.47	1.54	
KATL-KMCO-KTSY -KATL	>0	0	5.23	.09	
KATL-KMCO-KBNA -KATL	>0	0	5.77	.01	
KATL-KMCO-KNQA -KATL	>0	0	6.56	.16	

KATL-KMCO-KJAN -KATL	>0	0	6.29	.47	
KATL-KMCO-KBHM -KATL	>0	0	5.18	.18	
KATL-KHST-KJAX -KATL	>0	0	5.78	1.63	
KATL-KHST-KTSY -KATL	>0	0	6.55	.08	
KATL-KHST-KBNA -KATL	>0	0	7.01	.08	
KATL-KHST-KNQA -KATL	>0	0	7.80	.23	
KATL-KHST-KJAN -KATL	>0	0	7.45	.62	
KATL-KHST-KBHM -KATL	>0	0	6.45	.22	
KATL-KJAX-KTSY -KATL	>0	0	4.44	.12	
KATL-KJAX-KBNA -KATL	0	>0	5.01	.01	
KATL-KJAX-KNQA -KATL	0	>0	5.88	.08	
KATL-KJAX-KJAN -KATL	0	>0	5.71	.29	
KATL-KJAX-KBHM -KATL	0	>0	4.49	.11	
KATL-KTSY-KBNA -KATL	>0	0	3.77	.47	
KATL-KTSY-KNQA -KATL	>0	0	4.77	.41	
KATL-KTSY-KJAN -KATL	>0	0	5.01	.21	
KATL-KTSY-KBHM -KATL	>0	0	3.62	.20	
KATL-KBNA-KNQA -KATL	0	0	4.47	1.17	
KATL-KBNA-KJAN -KATL	0	>0	4.86	.82	
KATL-KBNA-KBHM -KATL	0	>0	3.65	.63	
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	
KATL-KNQA-KBHM -KATL	>0	0	4.33	.89	
KATL-KJAN-KBHM -KATL	>0	0	4.34	.92	
KATL-KMCO-KHST -KJAX-KATL	0	>0	6.79	1.63	Unfeasible/Cap
KATL-KMCO-KHST -KTSY-KATL	>0	0	7.56	.08	

KATL-KMCO-KHST -KBNA-KATL	0	>0	8.07	.03	
KATL-KMCO-KHST -KNQA-KATL	>0	0	8.81	.23	
KATL-KMCO-KHST -KJAN-KATL	>0	0	8.61	.47	
KATL-KMCO-KHST -KBHM-KATL	0	>0	7.50	.18	
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	Feasible/Combine
KATL-KJAN-KNQA -KTSY-KATL	>0	0	6.40	.41	
KATL-KJAN-KNQA -KBHM-KATL	0	>0	5.93	.92	Unfeasible/Cap
KATL-KJAN-KNQA -KBNA-KATL	0	>0	6.10	1.17	Unfeasible/Cap
KATL-KMCO-KHST -KJAX-KATL	0	>0	6.79	1.63	Unfeasible/Cap
KATL-KMCO-KHST -KTSY-KATL	>0	0	7.56	.08	
KATL-KMCO-KHST -KBNA-KATL	0	>0	8.07	.03	
KATL-KMCO-KHST -KBHM-KATL	>0	0	7.50	.18	
KATL-KTSY-KBNA -KATL	>0	0	3.77	.47	Feasible/Select
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	Feasible/Select
KATL-KMCO-KHST -KBHM-KATL	>0	0	7.50	.18	Feasible/Select
KATL-KJAX-KATL	>0	0	2.67	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KATL-KMCO-KATL
KATL-KJAX-KATL
KATL-KBNA-KTSY-KATL
KATL-KJAN-KNQA-KATL
KATL-KHST-KMCO-KBHM-KATL

Total Time: 22.29
Aircraft Required: 3

Applicable Days: 9-12, 85-86

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KATL-KMCO-KATL	0	>0	3.43	-	Feasible/Select
KATL-KJAX-KATL	>0	0	2.67	-	
KATL-KBNA-KATL	>0	0	2.35	-	
KATL-KHST-KATL	>0	0	4.74	-	
KATL-KTSY-KATL	>0	0	1.89	-	
KATL-KBHM-KATL	>0	0	1.93	-	
KATL-KJAN-KATL	>0	0	3.33	-	
KATL-KNQA-KATL	>0	0	3.29	-	
KATL-KMCO-KATL	>0	0	3.43	-	
KATL-KMCO-KHST -KATL	>0	0	5.75	2.42	Feasible/Combine
KATL-KMCO-KJAX -KATL	>0	0	4.47	1.54	
KATL-KMCO-KTSY -KATL	>0	0	5.23	.09	
KATL-KMCO-KBNA -KATL	>0	0	5.77	.01	
KATL-KMCO-KNQA -KATL	>0	0	6.56	.16	
KATL-KMCO-KJAN -KATL	>0	0	6.29	.47	
KATL-KMCO-KBHM -KATL	>0	0	5.18	.18	
KATL-KHST-KJAX -KATL	>0	0	5.78	1.63	
KATL-KHST-KTSY -KATL	>0	0	6.55	.08	
KATL-KHST-KBNA -KATL	>0	0	7.01	.08	
KATL-KHST-KNQA -KATL	>0	0	7.80	.23	
KATL-KHST-KJAN -KATL	>0	0	7.45	.62	
KATL-KHST-KBHM -KATL	>0	0	6.45	.22	
KATL-KJAX-KTSY -KATL	>0	0	4.44	.12	
KATL-KJAX-KBNA -KATL	0	>0	5.01	.01	
KATL-KJAX-KNQA -KATL	0	>0	5.88	.08	
KATL-KJAX-KJAN -KATL	0	>0	5.71	.29	

KATL-KJAX-KBHM -KATL	0	>0	4.49	.11	
KATL-KTSY-KBNA -KATL	>0	0	3.77	.47	
KATL-KTSY-KNQA -KATL	>0	0	4.77	.41	
KATL-KTSY-KJAN -KATL	>0	0	5.01	.21	
KATL-KTSY-KBHM -KATL	>0	0	3.62	.20	
KATL-KBNA-KNQA -KATL	0	0	4.47	1.17	
KATL-KBNA-KJAN -KATL	0	>0	4.86	.82	
KATL-KBNA-KBHM -KATL	0	>0	3.65	.63	
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	
KATL-KNQA-KBHM -KATL	>0	0	4.33	.89	
KATL-KJAN-KBHM -KATL	>0	0	4.34	.92	
KATL-KMCO-KHST -KJAX-KATL	0	>0	6.79	1.63	Unfeasible/Cap
KATL-KMCO-KHST -KTSY-KATL	>0	0	7.56	.08	
KATL-KMCO-KHST -KBNA-KATL	0	>0	8.07	.03	
KATL-KMCO-KHST -KNQA-KATL	>0	0	8.81	.23	
KATL-KMCO-KHST -KJAN-KATL	>0	0	8.61	.47	
KATL-KMCO-KHST -KBHM-KATL	0	>0	7.50	.18	
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	Feasible/Combine
KATL-KJAN-KNQA -KTSY-KATL	>0	0	6.40	.41	
KATL-KJAN-KNQA -KBHM-KATL	0	>0	5.93	.92	Unfeasible/Cap
KATL-KJAN-KNQA -KBNA-KATL	0	>0	6.10	1.17	Unfeasible/Cap
KATL-KMCO-KHST -KJAX-KATL	0	>0	6.79	1.63	Unfeasible/Cap
KATL-KMCO-KHST -KTSY-KATL	>0	0	7.56	.08	
KATL-KMCO-KHST -KBNA-KATL	0	>0	8.07	.03	

KATL-KMCO-KHST -KBHM-KATL	0	>0	7.50	.18	
KATL-KTSY-KBNA -KATL	>0	0	3.77	.47	Feasible/Select
KATL-KMCO-KHST -KATL	>0	0	5.75	2.42	Feasible/Select
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	Feasible/Select
KATL-KJAX-KBHM -KATL	0	>0	4.49	.11	Unfeasible/Cap
KATL-KJAX-KATL	>0	0	2.67	-	Feasible/Select
KATL-KBHM-KATL	>0	0	1.93	-	Feasible/Select

Split Delivery Calculations

Route	C	U	T	S	Remarks
KATL-KMCO-KHST -KJAX-KATL + KATL-KBNA-KTSY -KJAX-KATL	0	0	13.00	-.81	No Savings

Selected Routes

KATL-KMCO-KATL
KATL-KJAX-KATL
KATL-KBHM-KATL
KATL-KJAN-KNQA-KATL
KATL-KHST-KMCO-KATL
KATL-KBNA-KTSY-KATL

Total Time: 22.47
Aircraft Required: 3

Applicable Days: 13, 17, 89-90

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KATL-KMCO-KATL	0	>0	3.43	-	Feasible/Select
KATL-KJAX-KATL	>0	0	2.67	-	
KATL-KBNA-KATL	>0	0	2.35	-	
KATL-KHST-KATL	>0	0	4.74	-	
KATL-KTSY-KATL	>0	0	1.89	-	
KATL-KBHM-KATL	>0	0	1.93	-	

KATL-KBNA-KBHM -KATL	>0	0	3.65	.63	
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	Feasible/Combine
KATL-KNQA-KBHM -KATL	>0	0	4.33	.89	
KATL-KJAN-KBHM -KATL	>0	0	4.34	.92	
KATL-KJAN-KNQA -KTSY-KATL	>0	0	6.40	.41	
KATL-KJAN-KNQA -KBNA-KATL	>0	0	6.10	1.17	
KATL-KNQA-KJAN -KBHM-KATL	>0	0	5.93	.92	
KATL-KNQA-KJAN -KMCO-KATL	0	>0	7.88	.47	
KATL-KNQA-KJAN -KJAX-KATL	>0	0	7.30	.29	
KATL-KMCO-KJAX -KATL	>0	0	4.47	1.54	Feasible/Combine
KATL-KMCO-KJAX -KTSY-KATL	>0	0	6.24	.12	
KATL-KMCO-KJAX -KBNA-KATL	>0	0	6.81	.01	
KATL-KBHM-KMCO -KJAX-KATL	>0	0	6.29	.11	
KATL-KJAN-KNQA -KTSY-KATL	>0	0	6.40	.41	
KATL-KJAN-KNQA -KBNA-KATL	>0	0	6.10	1.17	Feasible/Combine
KATL-KNQA-KJAN -KBHM-KATL	>0	0	5.93	.92	
KATL-KJAN-KNQA -KBNA-KTSY-KATL	>0	0	7.42	.57	Feasible/Select
KATL-KBHM-KJAN -KNQA-KBNA-KATL	0	>0	7.12	.91	Unfeasible/Cap
KATL-KMCO-KJAX -KTSY-KATL	>0	0	6.24	.12	
KATL-KMCO-KJAX -KBNA-KATL	>0	0	6.81	.01	
KATL-KBHM-KMCO -KJAX-KATL	>0	0	6.29	.11	
KATL-KJAN-KNQA -KBNA-KTSY-KATL	>0	0	7.23	.76	Feasible/Select
KATL-KBHM-KMCO -KJAX-KATL	>0	0	6.29	.11	Feasible/Select

Applicable Days: 46

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KATL-KJAX-KATL	>0	0	2.67	-	
KATL-KBNA-KATL	>0	0	2.35	-	
KATL-KTSY-KATL	>0	0	1.89	-	
KATL-KBHM-KATL	>0	0	1.93	-	
KATL-KJAN-KATL	>0	0	3.33	-	
KATL-KNQA-KATL	>0	0	3.29	-	
KATL-KMCO-KATL	0	>0	3.43	-	Feasible/Select
KATL-KMCO-KATL	>0	0	3.43	-	
KATL-KMCO-KJAX -KATL	>0	0	4.47	1.54	
KATL-KMCO-KTSY -KATL	>0	0	5.23	.09	
KATL-KMCO-KBNA -KATL	>0	0	5.77	.01	
KATL-KMCO-KNQA -KATL	>0	0	6.56	.16	
KATL-KMCO-KJAN -KATL	>0	0	6.29	.47	
KATL-KMCO-KBHM -KATL	>0	0	5.18	.18	
KATL-KJAX-KTSY -KATL	>0	0	4.44	.12	
KATL-KJAX-KBNA -KATL	>0	0	5.01	.01	
KATL-KJAX-KNQA -KATL	>0	0	5.88	.08	
KATL-KJAX-KJAN -KATL	>0	0	5.71	.29	
KATL-KJAX-KBHM -KATL	>0	0	4.49	.11	
KATL-KTSY-KBNA -KATL	>0	0	3.77	.47	
KATL-KTSY-KNQA -KATL	>0	0	4.77	.41	
KATL-KTSY-KJAN -KATL	>0	0	5.01	.21	
KATL-KTSY-KBHM -KATL	>0	0	3.62	.20	
KATL-KBNA-KNQA -KATL	>0	0	4.47	1.17	
KATL-KBNA-KJAN -KATL	>0	0	4.86	.82	

KATL-KJAX-KATL	>0	0	2.67	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KATL-KJAX-KATL
KATL-KMCO-KBHM-KATL
KATL-KJAN-KNQA-KBNA-KTSY-KATL

Total Time: 15.08
Aircraft Required: 2

Applicable Days: 19-28, 47-49, 75-84

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KATL-KJAX-KATL	>0	0	2.67	-	
KATL-KBNA-KATL	>0	0	2.35	-	
KATL-KMCO-KATL	>0	0	3.43	-	
KATL-KMCO-KJAX -KATL	>0	0	4.47	1.54	Feasible/Combine
KATL-KMCO-KBNA -KATL	>0	0	5.77	.01	
KATL-KJAX-KBNA -KATL	>0	0	5.01	.01	
KATL-KMCO-KJAX -KBNA-KATL	>0	0	6.81	.01	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KATL-KMCO-KJAX-KBNA-KATL

Total Time: 6.81
Aircraft Required: 1

KATL-KJAX-KJAN -KATL	>0	0	5.71	.29	
KATL-KJAX-KBHM -KATL	>0	0	4.49	.11	
KATL-KTSY-KBNA -KATL	>0	0	3.77	.47	
KATL-KTSY-KNQA -KATL	>0	0	4.77	.41	
KATL-KTSY-KJAN -KATL	>0	0	5.01	.21	
KATL-KTSY-KBHM -KATL	>0	0	3.62	.20	
KATL-KBNA-KNQA -KATL	>0	0	4.47	1.17	
KATL-KBNA-KJAN -KATL	>0	0	4.86	.82	
KATL-KBNA-KBHM -KATL	>0	0	3.65	.63	
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	Feasible/Combine
KATL-KNQA-KBHM -KATL	>0	0	4.33	.89	
KATL-KJAN-KBHM -KATL	>0	0	4.34	.92	
KATL-KJAN-KNQA -KTSY-KATL	>0	0	6.40	.41	
KATL-KJAN-KNQA -KBNA-KATL	>0	0	6.10	1.17	Feasible/Combine
KATL-KNQA-KJAN -KBHM-KATL	>0	0	5.93	.92	
KATL-KNQA-KJAN -KMCO-KATL	0	>0	7.88	.47	
KATL-KNQA-KJAN -KJAX-KATL	>0	0	7.30	.29	
KATL-KJAN-KNQA -KBNA-KTSY-KATL	>0	0	7.42	.57	Feasible/Select
KATL-KBHM-KJAN -KNQA-KBNA-KATL	0	>0	7.12	.91	Unfeasible/Cap
KATL-KJAN-KNQA -KBNA-KJAX-KATL	0	>0	8.77	0	Unfeasible/Cap
KATL-KMCO-KJAX -KATL	0	>0	4.47	1.54	Unfeasible/Cap
KATL-KMCO-KTSY -KATL	>0	0	5.23	.09	
KATL-KMCO-KBHM -KATL	0	0	5.18	.18	Feasible/Select
KATL-KJAX-KBHM -KATL	>0	0	4.49	.11	

KATL-KBHM-KATL	>0	0	1.93	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KATL-KMCO-KATL
KATL-KBHM-KATL
KATL-KBNA-KTSY-KATL
KATL-KJAN-KNQA-KATL
KATL-KMCO-KHST-KJAX-KATL

Total Time: 20.84
Aircraft Required: 3

Applicable Days: 18, 74

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KATL-KJAX-KATL	>0	0	2.67	-	
KATL-KBNA-KATL	>0	0	2.35	-	
KATL-KTSY-KATL	>0	0	1.89	-	
KATL-KBHM-KATL	>0	0	1.93	-	
KATL-KJAN-KATL	>0	0	3.33	-	
KATL-KNQA-KATL	>0	0	3.29	-	
KATL-KMCO-KATL	>0	0	3.43	-	
KATL-KMCO-KJAX -KATL	0	>0	4.47	1.54	
KATL-KMCO-KTSY -KATL	>0	0	5.23	.09	
KATL-KMCO-KBNA -KATL	0	>0	5.77	.01	
KATL-KMCO-KNQA -KATL	>0	0	6.56	.16	
KATL-KMCO-KJAN -KATL	>0	0	6.29	.47	
KATL-KMCO-KBHM -KATL	0	0	5.18	.18	
KATL-KJAX-KTSY -KATL	>0	0	4.44	.12	
KATL-KJAX-KBNA -KATL	>0	0	5.01	.01	
KATL-KJAX-KNQA -KATL	>0	0	5.88	.08	

KATL-KJAN-KBHM -KATL	0	>0	4.34	.92	
KATL-KMCO-KHST -KJAX-KATL	>0	0	6.79	1.63	
KATL-KMCO-KHST -KTSY-KATL	>0	0	7.56	.08	
KATL-KMCO-KHST -KBNA-KATL	>0	0	8.07	.03	
KATL-KMCO-KHST -KNQA-KATL	>0	0	8.81	.23	
KATL-KMCO-KHST -KJAN-KATL	>0	0	8.61	.47	
KATL-KMCO-KHST -KBHM-KATL	>0	0	7.50	.18	
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	Feasible/Combine
KATL-KJAN-KNQA -KTSY-KATL	0	>0	6.40	.41	
KATL-KMCO-KHST -KJAX-KATL	>0	0	6.79	1.63	Feasible/Combine
KATL-KMCO-KHST -KTSY-KATL	>0	0	7.56	.08	
KATL-KMCO-KHST -KBNA-KATL	>0	0	8.07	.03	
KATL-KMCO-KHST -KBHM-KATL	>0	0	7.50	.18	
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	Feasible/Combine
KATL-KMCO-KHST -KJAX-KTSY-KATL	0	>0	8.56	.12	Unfeasible/Cap
KATL-KJAX-KHST -KMCO-KBNA-KATL	0	>0	9.13	.01	Unfeasible/Cap
KATL-KJAX-KHST -KMCO-KBHM-KATL	0	>0	8.54	.18	Unfeasible/Cap
KATL-KMCO-KHST -KJAX-KATL	>0	0	6.79	1.63	Feasible/Select
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	Feasible/Select
KATL-KTSY-KBNA -KATL	>0	0	3.77	.47	Feasible/Select
KATL-KTSY-KBHM -KATL	>0	0	3.62	.20	
KATL-KBNA-KBHM -KATL	0	>0	3.65	.63	

KATL-KMCO-KTSY -KATL	>0	0	5.23	.09
KATL-KMCO-KBNA -KATL	>0	0	5.77	.01
KATL-KMCO-KNQA -KATL	>0	0	6.56	.16
KATL-KMCO-KJAN -KATL	>0	0	6.29	.47
KATL-KMCO-KBHM -KATL	>0	0	5.18	.18
KATL-KHST-KJAX -KATL	>0	0	5.78	1.63
KATL-KHST-KTSY -KATL	>0	0	6.55	.08
KATL-KHST-KBNA -KATL	>0	0	7.01	.08
KATL-KHST-KNQA -KATL	>0	0	7.80	.23
KATL-KHST-KJAN -KATL	>0	0	7.45	.62
KATL-KHST-KBHM -KATL	>0	0	6.45	.22
KATL-KJAX-KTSY -KATL	>0	0	4.44	.12
KATL-KJAX-KBNA -KATL	0	>0	5.01	.01
KATL-KJAX-KNQA -KATL	>0	0	5.88	.08
KATL-KJAX-KJAN -KATL	0	>0	5.71	.29
KATL-KJAX-KBHM -KATL	0	>0	4.49	.11
KATL-KTSY-KBNA -KATL	>0	0	3.77	.47
KATL-KTSY-KNQA -KATL	>0	0	4.77	.41
KATL-KTSY-KJAN -KATL	>0	0	5.01	.21
KATL-KTSY-KBHM -KATL	>0	0	3.62	.20
KATL-KBNA-KNQA -KATL	0	>0	4.47	1.17
KATL-KBNA-KJAN -KATL	0	>0	4.86	.82
KATL-KBNA-KBHM -KATL	0	>0	3.65	.63
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70
KATL-KNQA-KBHM -KATL	>0	0	4.33	.89

KATL-KJAN-KATL	>0	0	3.33	-	
KATL-KNQA-KATL	>0	0	3.29	-	
KATL-KMCO-KATL	>0	0	3.43	-	
KATL-KMCO-KHST -KATL	>0	0	5.75	2.42	Feasible/Combine
KATL-KMCO-KJAX -KATL	>0	0	4.47	1.54	
KATL-KMCO-KTSY -KATL	>0	0	5.23	.09	
KATL-KMCO-KBNA -KATL	>0	0	5.77	.01	
KATL-KMCO-KNQA -KATL	>0	0	6.56	.16	
KATL-KMCO-KJAN -KATL	>0	0	6.29	.47	
KATL-KMCO-KBHM -KATL	>0	0	5.18	.18	
KATL-KHST-KJAX -KATL	>0	0	5.78	1.63	
KATL-KHST-KTSY -KATL	>0	0	6.55	.08	
KATL-KHST-KBNA -KATL	>0	0	7.01	.08	
KATL-KHST-KNQA -KATL	>0	0	7.80	.23	
KATL-KHST-KJAN -KATL	>0	0	7.45	.62	
KATL-KHST-KBHM -KATL	>0	0	6.45	.22	
KATL-KJAX-KTSY -KATL	>0	0	4.44	.12	
KATL-KJAX-KBNA -KATL	0	>0	5.01	.01	
KATL-KJAX-KNQA -KATL	>0	0	5.88	.08	
KATL-KJAX-KJAN -KATL	>0	0	5.71	.29	
KATL-KJAX-KBHM -KATL	0	>0	4.49	.11	
KATL-KTSY-KBNA -KATL	0	>0	3.77	.47	
KATL-KTSY-KNQA -KATL	>0	0	4.77	.41	
KATL-KTSY-KJAN -KATL	>0	0	5.01	.21	
KATL-KTSY-KBHM -KATL	0	>0	3.62	.20	
KATL-KBNA-KNQA -KATL	0	>0	4.47	1.17	

KATL-KBNA-KJAN -KATL	0	>0	4.86	.82	
KATL-KBNA-KBHM -KATL	0	>0	3.65	.63	
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	
KATL-KNQA-KBHM -KATL	0	>0	4.33	.89	
KATL-KJAN-KBHM -KATL	0	>0	4.34	.92	
KATL-KMCO-KHST -KJAX-KATL	>0	0	6.79	1.63	
KATL-KMCO-KHST -KTSY-KATL	>0	0	7.56	.08	
KATL-KMCO-KHST -KBNA-KATL	0	>0	8.07	.03	
KATL-KMCO-KHST -KNQA-KATL	>0	0	8.81	.23	
KATL-KMCO-KHST -KJAN-KATL	>0	0	8.61	.47	
KATL-KMCO-KHST -KBHM-KATL	0	>0	7.50	.18	
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	Feasible/Combine
KATL-KJAN-KNQA -KTSY-KATL	>0	0	6.40	.41	Feasible/Select
KATL-KJAN-KNQA -KJAX-KATL	0	>0	7.51	.08	Unfeasible/Cap
KATL-KMCO-KHST -KJAX-KTSY-KATL	0	>0	8.56	.12	Unfeasible/Cap
KATL-KJAX-KHST -KMCO-KJAN-KATL	0	>0	9.66	.46	Unfeasible/Cap
KATL-KJAX-KHST -KMCO-KNQA-KATL	0	>0	9.92	.16	Unfeasible/Cap
KATL-KMCO-KHST -KJAX-KATL	>0	0	6.79	1.63	Feasible/Select
KATL-KBNA-KBHM -KATL	0	>0	3.65	.63	Unfeasible/Cap
KATL-KBNA-KATL	>0	0	2.35	-	Feasible/Select
KATL-KBHM-KATL	>0	0	1.93	-	Feasible/Select

Split Delivery Calculations

Route	C	U	T	S	Remarks
KATL-KBHM-KNQA -KATL + KATL -KBNA-KNQA-KATL	0	0	8.80	-3.13	No Savings
KATL-KMCO-KHST -KJAX-KTSY-KATL + KATL-KBNA-KTSY -KATL	0	0	17.25	-1.71	No Savings
KATL-KJAX-KHST -KMCO-KJAN-KATL + KATL-KBHM-KJAN -KATL	0	0	18.77	-3.65	No Savings

Selected Routes

KATL-KMCO-KATL
KATL-KBNA-KATL
KATL-KBHM-KATL
KATL-KMCO-KHST-KJAX-KATL
KATL-KJAN-KNQA-KTSY-KATL

Total Time: 20.90
Aircraft Required: 3

Applicable Days: 14-17, 29-40, 45, 57-73, 88-90

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KATL-KMCO-KATL	0	>0	3.43	-	Feasible/Select
KATL-KJAX-KATL	>0	0	2.67	-	
KATL-KBNA-KATL	>0	0	2.35	-	
KATL-KHST-KATL	>0	0	4.74	-	
KATL-KTSY-KATL	>0	0	1.89	-	
KATL-KBHM-KATL	>0	0	1.93	-	
KATL-KJAN-KATL	>0	0	3.33	-	
KATL-KNQA-KATL	>0	0	3.29	-	
KATL-KMCO-KATL	>0	0	3.43	-	
KATL-KMCO-KHST -KATL	>0	0	5.75	2.42	Feasible/Combine
KATL-KMCO-KJAX -KATL	>0	0	4.47	1.54	

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KATL-KMCO-KATL
KATL-KBHM-KMCO-KJAX-KATL
KATL-KJAN-KNQA-KBNA-KTSY-KATL

Total Time: 16.88
Aircraft Required: 3

Applicable Days: 50

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KATL-KJAX-KATL	0	>0	2.67	-	Feasible/Select
KATL-KBNA-KATL	>0	0	2.35	-	
KATL-KTSY-KATL	>0	0	1.89	-	
KATL-KBHM-KATL	>0	0	1.93	-	
KATL-KJAN-KATL	>0	0	3.33	-	
KATL-KNQA-KATL	>0	0	3.29	-	
KATL-KMCO-KATL	>0	0	3.43	-	
KATL-KJAX-KATL	>0	0	2.67	-	
KATL-KMCO-KJAX -KATL	0	>0	4.47	1.54	
KATL-KMCO-KTSY -KATL	0	>0	5.23	.09	
KATL-KMCO-KBNA -KATL	0	>0	5.77	.01	
KATL-KMCO-KNQA -KATL	0	>0	6.56	.16	
KATL-KMCO-KJAN -KATL	>0	0	6.29	.47	
KATL-KMCO-KBHM -KATL	0	>0	5.18	.18	
KATL-KJAX-KTSY -KATL	>0	0	4.44	.12	
KATL-KJAX-KBNA -KATL	>0	0	5.01	.01	
KATL-KJAX-KNQA -KATL	>0	0	5.88	.08	
KATL-KJAX-KJAN -KATL	>0	0	5.71	.29	

KATL-KJAX-KBHM -KATL	>0	0	4.49	.11	
KATL-KTSY-KBNA -KATL	>0	0	3.77	.47	
KATL-KTSY-KNQA -KATL	>0	0	4.77	.41	
KATL-KTSY-KJAN -KATL	>0	0	5.01	.21	
KATL-KTSY-KBHM -KATL	>0	0	3.62	.20	
KATL-KBNA-KNQA -KATL	>0	0	4.47	1.17	
KATL-KBNA-KJAN -KATL	>0	0	4.86	.82	
KATL-KBNA-KBHM -KATL	>0	0	3.65	.63	
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	Feasible/Combine
KATL-KNQA-KBHM -KATL	>0	0	4.33	.89	
KATL-KJAN-KBHM -KATL	>0	0	4.34	.92	
KATL-KJAN-KNQA -KTSY-KATL	>0	0	6.40	.41	
KATL-KJAN-KNQA -KBNA-KATL	>0	0	6.10	1.17	Feasible/Combine
KATL-KNQA-KJAN -KBHM-KATL	>0	0	5.93	.92	
KATL-KNQA-KJAN -KMCO-KATL	0	>0	7.88	.47	
KATL-KNQA-KJAN -KJAX-KATL	>0	0	7.30	.29	
KATL-KJAN-KNQA -KBNA-KTSY-KATL	0	0	7.42	.57	Feasible/Select
KATL-KBHM-KJAN -KNQA-KBNA-KATL	0	>0	7.12	.91	Unfeasible/Cap
KATL-KJAN-KNQA -KBNA-KJAX-KATL	0	0	8.77	0	
KATL-KBNA-KNQA -KJAN-KMCO-KATL	0	>0	9.07	.46	
KATL-KMCO-KJAX -KATL	0	>0	4.47	1.54	
KATL-KMCO-KBHM -KATL	0	>0	5.18	.18	
KATL-KJAX-KBHM -KATL	>0	0	4.49	.11	Feasible/Select
KATL-KMCO-KATL	>0	0	3.43	-	Feasible/Select

Split Delivery Calculations

KATL-KMCO-KATL
KATL-KJAX-KATL
KATL-KBHM-KJAX-KATL
KATL-KJAN-KNQA-KBNA-KTSY-KATL

Total Time: 17.82
Aircraft Required: 3

Applicable Days: 51

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KATL-KJAX-KATL	0	>0	2.67	-	Feasible/Select
KATL-KBNA-KATL	>0	0	2.35	-	
KATL-KTSY-KATL	>0	0	1.89	-	
KATL-KBHM-KATL	>0	0	1.93	-	
KATL-KJAN-KATL	>0	0	3.33	-	
KATL-KNQA-KATL	>0	0	3.29	-	
KATL-KMCO-KATL	>0	0	3.43	-	
KATL-KJAX-KATL	>0	0	2.67	-	
KATL-KMCO-KJAX-KATL	0	>0	4.47	1.54	
KATL-KMCO-KTSY-KATL	0	>0	5.23	.09	
KATL-KMCO-KBNA-KATL	0	>0	5.77	.01	
KATL-KMCO-KNQA-KATL	0	>0	6.56	.16	
KATL-KMCO-KJAN-KATL	0	>0	6.29	.47	
KATL-KMCO-KBHM-KATL	0	>0	5.18	.18	
KATL-KJAX-KTSY-KATL	>0	0	4.44	.12	
KATL-KJAX-KBNA-KATL	>0	0	5.01	.01	
KATL-KJAX-KNQA-KATL	>0	0	5.88	.08	
KATL-KJAX-KJAN-KATL	>0	0	5.71	.29	
KATL-KJAX-KBHM-KATL	>0	0	4.49	.11	

KATL-KTSY-KBNA -KATL	>0	0	3.77	.47	
KATL-KTSY-KNQA -KATL	>0	0	4.77	.41	
KATL-KTSY-KJAN -KATL	>0	0	5.01	.21	
KATL-KTSY-KBHM -KATL	>0	0	3.62	.20	
KATL-KBNA-KNQA -KATL	>0	0	4.47	1.17	
KATL-KBNA-KJAN -KATL	>0	0	4.86	.82	
KATL-KBNA-KBHM -KATL	>0	0	3.65	.63	
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	Feasible/Combine
KATL-KNQA-KBHM -KATL	>0	0	4.33	.89	
KATL-KJAN-KBHM -KATL	>0	0	4.34	.92	
KATL-KJAN-KNQA -KTSY-KATL	>0	0	6.40	.41	
KATL-KJAN-KNQA -KBNA-KATL	0	>0	6.10	1.17	Unfeasible/Cap
KATL-KNQA-KJAN -KBHM-KATL	>0	0	5.93	.92	Feasible/Combine
KATL-KNQA-KJAN -KMCO-KATL	0	>0	7.88	.47	
KATL-KNQA-KJAN -KJAX-KATL	>0	0	7.30	.29	
KATL-KBHM-KJAN -KNQA-KTSY-KATL	>0	0	7.62	.20	
KATL-KBHM-KNQA -KJAN-KJAX-KATL	>0	0	8.48	.12	
KATL-KTSY-KBNA -KATL	>0	0	3.77	.47	Feasible/Combine
KATL-KBNA-KTSY -KJAX-KATL	>0	0	6.21	.23	Feasible/Select
KATL-KNQA-KJAN -KBHM-KATL	>0	0	5.93	.92	Feasible/Select
KATL-KMCO-KATL	>0	0	3.43	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KATL-KJAX-KATL
KATL-KMCO-KATL
KATL-KBNA-KTSY-KJAX-KATL
KATL-KBHM-KJAN-KNQA-KATL

Total Time: 18.24
Aircraft Required: 3

Applicable Days: 52-55

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KATL-KJAX-KATL	0	>0	2.67	-	Feasible/Select
KATL-KBNA-KATL	>0	0	2.35	-	
KATL-KTSY-KATL	>0	0	1.89	-	
KATL-KBHM-KATL	>0	0	1.93	-	
KATL-KJAN-KATL	>0	0	3.33	-	
KATL-KNQA-KATL	>0	0	3.29	-	
KATL-KMCO-KATL	>0	0	3.43	-	
KATL-KJAX-KATL	>0	0	2.67	-	
KATL-KMCO-KJAX -KATL	0	>0	4.47	1.54	
KATL-KMCO-KTSY -KATL	0	>0	5.23	.09	
KATL-KMCO-KBNA -KATL	0	>0	5.77	.01	
KATL-KMCO-KNQA -KATL	0	>0	6.56	.16	
KATL-KMCO-KJAN -KATL	>0	0	6.29	.47	
KATL-KMCO-KBHM -KATL	0	>0	5.18	.18	
KATL-KJAX-KTSY -KATL	>0	0	4.44	.12	
KATL-KJAX-KBNA -KATL	>0	0	5.01	.01	
KATL-KJAX-KNQA -KATL	>0	0	5.88	.08	
KATL-KJAX-KJAN -KATL	>0	0	5.71	.29	
KATL-KJAX-KBHM -KATL	>0	0	4.49	.11	
KATL-KTSY-KBNA -KATL	>0	0	3.77	.47	

KATL-KTSY-KNQA -KATL	>0	0	4.77	.41	
KATL-KTSY-KJAN -KATL	>0	0	5.01	.21	
KATL-KTSY-KBHM -KATL	>0	0	3.62	.20	
KATL-KBNA-KNQA -KATL	>0	0	4.47	1.17	
KATL-KBNA-KJAN -KATL	>0	0	4.86	.82	
KATL-KBNA-KBHM -KATL	>0	0	3.65	.63	
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	Feasible/Combine
KATL-KNQA-KBHM -KATL	>0	0	4.33	.89	
KATL-KJAN-KBHM -KATL	>0	0	4.34	.92	
KATL-KJAN-KNQA -KTSY-KATL	>0	0	6.40	.41	
KATL-KJAN-KNQA -KBNA-KATL	>0	0	6.10	1.17	Feasible/Combine
KATL-KNQA-KJAN -KBHM-KATL	>0	0	5.93	.92	
KATL-KNQA-KJAN -KMCO-KATL	0	>0	7.88	.47	
KATL-KNQA-KJAN -KJAX-KATL	>0	0	7.30	.29	
KATL-KJAN-KNQA -KBNA-KTSY-KATL	0	>0	7.42	.57	Unfeasible/Cap
KATL-KBHM-KJAN -KNQA-KBNA-KATL	0	>0	7.12	.91	Unfeasible/Cap
KATL-KJAN-KNQA -KBNA-KJAX-KATL	0	>0	8.77	0	Unfeasible/Cap
KATL-KJAN-KNQA -KBNA-KATL	>0	0	6.10	1.17	Feasible/Select
KATL-KMCO-KJAX -KATL	0	>0	4.47	1.54	Unfeasible/Cap
KATL-KMCO-KTSY -KATL	0	>0	5.23	.09	
KATL-KMCO-KBHM -KATL	0	>0	5.18	.18	
KATL-KJAX-KTSY -KATL	>0	0	4.44	.12	
KATL-KJAX-KBHM -KATL	>0	0	4.49	.11	

KATL-KTSY-KBHM -KATL	>0	0	3.62	.20	Feasible/Combine
KATL-KTSY-KBHM -KJAX-KATL	>0	0	6.17	.12	Feasible/Select
KATL-KMCO-KATL	>0	0	3.43	-	Feasible/Select

Split Delivery Calculations

Route	C	U	T	S	Remarks
KATL-KMCO-KBHM -KATL + KATL -KBHM-KJAN-KNQA -KBNA-KATL	>0	0	12.66	-2.16	No Savings

Selected Routes

KATL-KMCO-KATL
KATL-KJAX-KATL
KATL-KJAX-KTSY-KBHM-KATL
KATL-KBNA-KNQA-KJAN-KATL

Total Time: 18.37
Aircraft Required: 3

Applicable Days: 56

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KATL-KJAX-KATL	0	0	2.67	-	Feasible/Select
KATL-KBNA-KATL	>0	0	2.35	-	
KATL-KTSY-KATL	>0	0	1.89	-	
KATL-KBHM-KATL	>0	0	1.93	-	
KATL-KJAN-KATL	>0	0	3.33	-	
KATL-KNQA-KATL	>0	0	3.29	-	
KATL-KMCO-KATL	>0	0	3.43	-	
KATL-KMCO-KJAX -KATL	0	>0	4.47	1.54	
KATL-KMCO-KTSY -KATL	>0	0	5.23	.09	
KATL-KMCO-KBNA -KATL	0	>0	5.77	.01	
KATL-KMCO-KNQA -KATL	>0	0	6.56	.16	

KATL-KMCO-KJAN -KATL	>0	0	6.29	.47	
KATL-KMCO-KBHM -KATL	>0	0	5.18	.18	
KATL-KTSY-KBNA -KATL	>0	0	3.77	.47	
KATL-KTSY-KNQA -KATL	>0	0	4.77	.41	
KATL-KTSY-KJAN -KATL	>0	0	5.01	.21	
KATL-KTSY-KBHM -KATL	>0	0	3.62	.20	
KATL-KBNA-KNQA -KATL	>0	0	4.47	1.17	
KATL-KBNA-KJAN -KATL	>0	0	4.86	.82	
KATL-KBNA-KBHM -KATL	>0	0	3.65	.63	
KATL-KNQA-KJAN -KATL	>0	0	4.92	1.70	Feasible/Combine
KATL-KNQA-KBHM -KATL	>0	0	4.33	.89	
KATL-KJAN-KBHM -KATL	>0	0	4.34	.92	
KATL-KJAN-KNQA -KTSY-KATL	>0	0	6.40	.41	
KATL-KJAN-KNQA -KBNA-KATL	>0	0	6.10	1.17	Feasible/Combine
KATL-KNQA-KJAN -KBHM-KATL	>0	0	5.93	.92	
KATL-KNQA-KJAN -KMCO-KATL	0	>0	7.88	.47	
KATL-KJAN-KNQA -KBNA-KTSY-KATL	>0	0	7.42	.57	
KATL-KBHM-KJAN -KNQA-KBNA-KATL	>0	0	7.12	.91	Feasible/Select
KATL-KMCO-KTSY -KATL	>0	0	5.23	.09	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KATL-KJAX-KATL
KATL-KMCO-KTSY-KATL
KATL-KBNA-KNQA-KJAN-KBHM-KATL
Total Time: 15.02
Aircraft Required: 2

Appendix M: Routing Calculations for the Chicago Network

Ninety Day Patient Delivery Schedules

Airport: Cleveland

Day \ Category	1	2	3	4	5	6	Tot
1	0	0	16	15	0	0	31
2	0	0	16	15	0	0	31
3	0	0	16	15	0	0	31
4	0	0	16	15	0	0	31
5	0	0	16	15	0	0	31
6	0	0	16	15	0	0	31
7	0	0	16	13	0	0	29
8	0	0	16	0	0	0	16
9	0	0	16	0	0	0	16
10	0	0	16	0	0	9	25
11	0	0	16	0	0	20	36
12	0	0	16	0	0	4	20
13	0	0	16	0	0	0	16
14	0	0	16	0	0	0	16
15	0	0	16	0	0	0	16
16	0	0	16	0	0	0	16
17	0	0	16	0	0	0	16
18	0	0	15	0	0	0	15
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	16	0	0	0	16
30	0	0	16	0	0	0	16
31	0	0	16	0	0	0	16
32	0	0	16	0	0	0	16
33	0	0	16	0	0	0	16
34	0	0	16	0	0	0	16
35	0	0	16	0	0	0	16
36	0	0	16	0	0	0	16
37	0	0	16	0	0	0	16
38	0	0	16	0	0	0	16
39	0	0	16	0	0	0	16
40	0	0	16	0	0	0	16

41	0	0	16	0	0	0	16
42	0	0	16	0	0	0	16
43	0	0	16	0	0	0	16
44	0	0	16	0	0	0	16
45	0	0	16	0	0	0	16
46	0	0	15	0	0	0	15
47	0	0	0	0	0	9	9
48	0	0	0	0	0	20	20
49	0	0	0	0	0	4	4
50	0	0	0	15	0	0	15
51	0	0	0	15	0	0	15
52	0	0	0	15	0	0	15
53	0	0	0	15	0	0	15
54	0	0	0	15	0	0	15
55	0	0	0	15	0	0	15
56	0	0	0	13	0	0	13
57	0	0	16	0	0	0	16
58	0	0	16	0	0	0	16
59	0	0	16	0	0	0	16
60	0	0	16	0	0	0	16
61	0	0	16	0	0	0	16
62	0	0	16	0	0	0	16
63	0	0	16	0	0	0	16
64	0	0	16	0	0	0	16
65	0	0	16	0	0	0	16
66	0	0	16	0	0	0	16
67	0	0	16	0	0	0	16
68	0	0	16	0	0	0	16
69	0	0	16	0	0	0	16
70	0	0	16	0	0	0	16
71	0	0	16	0	0	0	16
72	0	0	16	0	0	0	16
73	0	0	16	0	0	0	16
74	0	0	15	0	0	0	15
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	9	9
85	0	0	16	0	0	20	36
86	0	0	16	0	0	4	20
87	0	0	16	0	0	0	16
88	0	0	16	0	0	0	16
89	0	0	16	0	0	0	16
90	0	0	16	0	0	0	16

Airport: Minneapolis

Category	1	2	3	4	5	6	Tot
Day							
1	0	0	19	11	0	0	30
2	0	0	19	11	0	0	30
3	0	0	19	11	0	0	30
4	0	0	19	11	0	0	30
5	0	0	19	11	0	0	30
6	0	0	19	11	0	0	30
7	0	0	19	7	0	0	26
8	0	0	19	0	0	0	19
9	0	0	19	0	0	0	19
10	0	0	19	0	0	0	19
11	0	0	19	0	0	0	19
12	0	0	19	0	0	0	19
13	0	0	19	0	0	0	19
14	0	0	19	0	0	11	30
15	0	0	19	0	0	0	19
16	0	0	19	0	0	0	19
17	0	0	19	0	0	0	19
18	0	0	15	0	0	0	15
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	19	0	0	0	19
30	0	0	19	0	0	0	19
31	0	0	19	0	0	0	19
32	0	0	19	0	0	0	19
33	0	0	19	0	0	0	19
34	0	0	19	0	0	0	19
35	0	0	19	0	0	0	19
36	0	0	19	0	0	0	19
37	0	0	19	0	0	0	19
39	0	0	19	0	0	0	19
39	0	0	19	0	0	0	19
40	0	0	19	0	0	0	19
41	0	0	19	0	0	0	19
42	0	0	19	0	0	0	19
43	0	0	19	0	0	0	19
44	0	0	19	0	0	0	19
45	0	0	19	0	0	0	19
46	0	0	15	0	0	0	15
47	0	0	0	0	0	0	0

48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	11	0	0	11
51	0	0	0	11	0	11	22
52	0	0	0	11	0	0	11
53	0	0	0	11	0	0	11
54	0	0	0	11	0	0	11
55	0	0	0	11	0	0	11
56	0	0	0	7	0	0	7
57	0	0	19	0	0	0	19
58	0	0	19	0	0	0	19
59	0	0	19	0	0	0	19
60	0	0	19	0	0	0	19
61	0	0	19	0	0	0	19
62	0	0	19	0	0	0	19
63	0	0	19	0	0	0	19
64	0	0	19	0	0	0	19
65	0	0	19	0	0	0	19
66	0	0	19	0	0	0	19
67	0	0	19	0	0	0	19
68	0	0	19	0	0	0	19
69	0	0	19	0	0	0	19
70	0	0	19	0	0	0	19
71	0	0	19	0	0	0	19
72	0	0	19	0	0	0	19
73	0	0	19	0	0	0	19
74	0	0	15	0	0	0	15
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	19	0	0	0	19
86	0	0	19	0	0	0	19
87	0	0	19	0	0	0	19
88	0	0	19	0	0	11	30
89	0	0	19	0	0	0	19
90	0	0	19	0	0	0	19

Airport: Des Moines

Day	Category 1	2	3	4	5	6	Tot
1	0	0	5	2	0	0	7
2	0	0	5	2	0	0	7
3	0	0	5	2	0	0	7
4	0	0	5	2	0	0	7
5	0	0	5	2	0	0	7
6	0	0	5	2	0	0	7
7	0	0	5	0	0	0	5
8	0	0	5	0	0	0	5
9	0	0	5	0	0	0	5
10	0	0	5	0	0	0	5
11	0	0	5	0	0	0	5
12	0	0	5	0	0	0	5
13	0	0	5	0	0	0	5
14	0	0	5	0	0	0	5
15	0	0	5	0	0	3	8
16	0	0	5	0	0	0	5
17	0	0	4	0	0	0	4
18	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	5	0	0	0	5
30	0	0	5	0	0	0	5
31	0	0	5	0	0	0	5
32	0	0	5	0	0	0	5
33	0	0	5	0	0	0	5
34	0	0	5	0	0	0	5
35	0	0	5	0	0	0	5
36	0	0	5	0	0	0	5
37	0	0	5	0	0	0	5
38	0	0	5	0	0	0	5
39	0	0	5	0	0	0	5
40	0	0	5	0	0	0	5
41	0	0	5	0	0	0	5
42	0	0	5	0	0	0	5
43	0	0	5	0	0	0	5
44	0	0	5	0	0	0	5
45	0	0	4	0	0	0	4
46	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0

48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	2	0	0	2
51	0	0	0	2	0	0	2
52	0	0	0	2	0	3	5
53	0	0	0	2	0	0	2
54	0	0	0	2	0	0	2
55	0	0	0	2	0	0	2
56	0	0	0	0	0	0	0
57	0	0	5	0	0	0	5
58	0	0	5	0	0	0	5
59	0	0	5	0	0	0	5
60	0	0	5	0	0	0	5
61	0	0	5	0	0	0	5
62	0	0	5	0	0	0	5
63	0	0	5	0	0	0	5
64	0	0	5	0	0	0	5
65	0	0	5	0	0	0	5
66	0	0	5	0	0	0	5
67	0	0	5	0	0	0	5
68	0	0	5	0	0	0	5
69	0	0	5	0	0	0	5
70	0	0	5	0	0	0	5
71	0	0	5	0	0	0	5
72	0	0	5	0	0	0	5
73	0	0	4	0	0	0	4
74	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	5	0	0	0	5
86	0	0	5	0	0	0	5
87	0	0	5	0	0	0	5
88	0	0	5	0	0	0	5
89	0	0	5	0	0	3	8
90	0	0	5	0	0	0	5

Airport: Indianapolis

Day	Category 1	2	3	4	5	6	Tot
1	0	0	5	5	0	0	10
2	0	0	5	5	0	0	10
3	0	0	5	5	0	0	10
4	0	0	5	5	0	0	10
5	0	0	5	5	0	0	10
6	0	0	5	5	0	0	10
7	0	0	5	3	0	0	8
8	0	0	5	0	0	0	5
9	0	0	5	0	0	0	5
10	0	0	5	0	0	0	5
11	0	0	5	0	0	0	5
12	0	0	5	0	0	0	5
13	0	0	5	0	0	0	5
14	0	0	5	0	0	0	5
15	0	0	5	0	0	3	8
16	0	0	5	0	0	0	5
17	0	0	4	0	0	0	4
18	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	5	0	0	0	5
30	0	0	5	0	0	0	5
31	0	0	5	0	0	0	5
32	0	0	5	0	0	0	5
33	0	0	5	0	0	0	5
34	0	0	5	0	0	0	5
35	0	0	5	0	0	0	5
36	0	0	5	0	0	0	5
37	0	0	5	0	0	0	5
38	0	0	5	0	0	0	5
39	0	0	5	0	0	0	5
40	0	0	5	0	0	0	5
41	0	0	5	0	0	0	5
42	0	0	5	0	0	0	5
43	0	0	5	0	0	0	5
44	0	0	5	0	0	0	5
45	0	0	4	0	0	0	4
46	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0

48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	5	0	0	5
51	0	0	0	5	0	0	5
52	0	0	0	5	0	3	8
53	0	0	0	5	0	0	5
54	0	0	0	5	0	0	5
55	0	0	0	5	0	0	5
56	0	0	0	3	0	0	5
57	0	0	5	0	0	0	5
58	0	0	5	0	0	0	5
59	0	0	5	0	0	0	5
60	0	0	5	0	0	0	5
61	0	0	5	0	0	0	5
62	0	0	5	0	0	0	5
63	0	0	5	0	0	0	5
64	0	0	5	0	0	0	5
65	0	0	5	0	0	0	5
66	0	0	5	0	0	0	5
67	0	0	5	0	0	0	5
68	0	0	5	0	0	0	5
69	0	0	5	0	0	0	5
70	0	0	5	0	0	0	5
71	0	0	5	0	0	0	5
72	0	0	5	0	0	0	5
73	0	0	4	0	0	0	4
74	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	5	0	0	0	5
86	0	0	5	0	0	0	5
87	0	0	5	0	0	0	5
88	0	0	5	0	0	0	5
89	0	0	5	0	0	3	8
90	0	0	5	0	0	0	5

Airport: Scott AFB

Day	Category 1	2	3	4	5	6	Tot
1	0	0	69	41	0	0	110
2	0	0	69	41	0	0	110
3	0	0	69	41	0	0	110
4	0	0	69	41	0	0	110
5	0	0	69	41	0	0	110
6	0	0	69	41	0	0	110
7	0	0	69	30	0	0	99
8	0	0	69	0	0	0	69
9	0	0	69	0	0	0	69
10	0	0	69	0	0	0	69
11	0	0	69	0	0	0	69
12	0	0	69	0	0	0	69
13	0	0	69	0	0	0	69
14	0	0	69	0	0	0	69
15	0	0	69	0	0	0	69
16	0	0	69	0	0	0	69
17	0	0	69	0	0	0	69
18	0	0	43	0	0	0	43
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	69	0	0	0	69
30	0	0	69	0	0	0	69
31	0	0	69	0	0	0	69
32	0	0	69	0	0	0	69
33	0	0	69	0	0	0	69
34	0	0	69	0	0	0	69
35	0	0	69	0	0	0	69
36	0	0	69	0	0	0	69
37	0	0	69	0	0	0	69
38	0	0	69	0	0	0	69
39	0	0	69	0	0	0	69
40	0	0	69	0	0	0	69
41	0	0	69	0	0	0	69
42	0	0	69	0	0	0	69
43	0	0	69	0	0	0	69
44	0	0	69	0	0	0	69
45	0	0	69	0	0	0	69
46	0	0	43	0	0	0	43
47	0	0	0	0	0	0	0

48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	41	0	0	41
51	0	0	0	41	0	0	41
52	0	0	0	41	0	0	41
53	0	0	0	41	0	0	41
54	0	0	0	41	0	0	41
55	0	0	0	41	0	0	41
56	0	0	0	30	0	0	30
57	0	0	69	0	0	0	69
58	0	0	69	0	0	0	69
59	0	0	69	0	0	0	69
60	0	0	69	0	0	0	69
61	0	0	69	0	0	0	69
62	0	0	69	0	0	0	69
63	0	0	69	0	0	0	69
64	0	0	69	0	0	0	69
65	0	0	69	0	0	0	69
66	0	0	69	0	0	0	69
67	0	0	69	0	0	0	69
68	0	0	69	0	0	0	69
69	0	0	69	0	0	0	69
70	0	0	69	0	0	0	69
71	0	0	69	0	0	0	69
72	0	0	69	0	0	0	69
73	0	0	69	0	0	0	69
74	0	0	43	0	0	0	43
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	69	0	0	0	69
86	0	0	69	0	0	0	69
87	0	0	69	0	0	0	69
88	0	0	69	0	0	0	69
89	0	0	69	0	0	0	69
90	0	0	69	0	0	0	69

Airport: Ft Leavenworth

Day	Category 1	2	3	4	5	6	Tot
1	0	0	22	12	0	0	34
2	0	0	22	12	0	0	34
3	0	0	22	12	0	0	34
4	0	0	22	12	0	0	34
5	0	0	22	12	0	0	34
6	0	0	22	12	0	0	34
7	0	0	22	12	0	0	34
8	0	0	22	0	0	0	22
9	0	0	22	0	0	0	22
10	0	0	22	0	0	0	22
11	0	0	22	0	0	0	22
12	0	0	22	0	0	0	22
13	0	0	22	0	0	0	22
14	0	0	22	0	0	3	25
15	0	0	22	0	0	3	25
16	0	0	22	0	0	0	22
17	0	0	22	0	0	0	22
18	0	0	8	0	0	0	8
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	22	0	0	0	22
30	0	0	22	0	0	0	22
31	0	0	22	0	0	0	22
32	0	0	22	0	0	0	22
33	0	0	22	0	0	0	22
34	0	0	22	0	0	0	22
35	0	0	22	0	0	0	22
36	0	0	22	0	0	0	22
37	0	0	22	0	0	0	22
38	0	0	22	0	0	0	22
39	0	0	22	0	0	0	22
40	0	0	22	0	0	0	22
41	0	0	22	0	0	0	22
42	0	0	22	0	0	0	22
43	0	0	22	0	0	0	22
44	0	0	22	0	0	0	22
45	0	0	22	0	0	0	22
46	0	0	8	0	0	0	8
47	0	0	0	0	0	0	0

48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	12	0	0	12
51	0	0	0	12	0	3	15
52	0	0	0	12	0	3	15
53	0	0	0	12	0	0	12
54	0	0	0	12	0	0	12
55	0	0	0	12	0	0	12
56	0	0	0	12	0	0	12
57	0	0	22	0	0	0	22
58	0	0	22	0	0	0	22
59	0	0	22	0	0	0	22
60	0	0	22	0	0	0	22
61	0	0	22	0	0	0	22
62	0	0	22	0	0	0	22
63	0	0	22	0	0	0	22
64	0	0	22	0	0	0	22
65	0	0	22	0	0	0	22
66	0	0	22	0	0	0	22
67	0	0	22	0	0	0	22
68	0	0	22	0	0	0	22
69	0	0	22	0	0	0	22
70	0	0	22	0	0	0	22
71	0	0	22	0	0	0	22
72	0	0	22	0	0	0	22
73	0	0	22	0	0	0	22
74	0	0	8	0	0	0	8
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	22	0	0	0	22
86	0	0	22	0	0	0	22
87	0	0	22	0	0	0	22
88	0	0	22	0	0	3	25
89	0	0	22	0	0	3	25
90	0	0	22	0	0	0	22

Airport: Lexington

Day	Category	1	2	3	4	5	6	Tot
1		0	0	22	29	0	0	51
2		0	0	22	29	0	0	51
3		0	0	22	29	0	0	51
4		0	0	22	29	0	0	51
5		0	0	22	29	0	0	51
6		0	0	22	29	0	0	51
7		0	0	22	18	0	0	40
8		0	0	22	0	0	0	22
9		0	0	22	0	0	0	22
10		0	0	22	0	0	0	22
11		0	0	22	0	0	0	22
12		0	0	22	0	0	0	22
13		0	0	22	0	0	0	22
14		0	0	22	0	0	0	22
15		0	0	22	0	0	1	23
16		0	0	22	0	0	0	22
17		0	0	22	0	0	0	22
18		0	0	21	0	0	0	21
19		0	0	0	0	0	0	0
20		0	0	0	0	0	0	0
21		0	0	0	0	0	0	0
22		0	0	0	0	0	0	0
23		0	0	0	0	0	0	0
24		0	0	0	0	0	0	0
25		0	0	0	0	0	0	0
26		0	0	0	0	0	0	0
27		0	0	0	0	0	0	0
28		0	0	0	0	0	0	0
29		0	0	22	0	0	0	22
30		0	0	22	0	0	0	22
31		0	0	22	0	0	0	22
32		0	0	22	0	0	0	22
33		0	0	22	0	0	0	22
34		0	0	22	0	0	0	22
35		0	0	22	0	0	0	22
36		0	0	22	0	0	0	22
37		0	0	22	0	0	0	22
38		0	0	22	0	0	0	22
39		0	0	22	0	0	0	22
40		0	0	22	0	0	0	22
41		0	0	22	0	0	0	22
42		0	0	22	0	0	0	22
43		0	0	22	0	0	0	22
44		0	0	22	0	0	0	22
45		0	0	22	0	0	0	22
46		0	0	21	0	0	0	21
47		0	0	0	0	0	0	0

48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	29	0	0	29
51	0	0	0	29	0	0	29
52	0	0	0	29	0	1	30
53	0	0	0	29	0	0	29
54	0	0	0	29	0	0	29
55	0	0	0	29	0	0	29
56	0	0	0	18	0	0	18
57	0	0	22	0	0	0	22
58	0	0	22	0	0	0	22
59	0	0	22	0	0	0	22
60	0	0	22	0	0	0	22
61	0	0	22	0	0	0	22
62	0	0	22	0	0	0	22
63	0	0	22	0	0	0	22
64	0	0	22	0	0	0	22
65	0	0	22	0	0	0	22
66	0	0	22	0	0	0	22
67	0	0	22	0	0	0	22
68	0	0	22	0	0	0	22
69	0	0	22	0	0	0	22
70	0	0	22	0	0	0	22
71	0	0	22	0	0	0	22
72	0	0	22	0	0	0	22
73	0	0	22	0	0	0	22
74	0	0	21	0	0	0	21
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	22	0	0	0	22
86	0	0	22	0	0	0	22
87	0	0	22	0	0	0	22
88	0	0	22	0	0	0	22
89	0	0	22	0	0	1	23
90	0	0	22	0	0	0	22

Airport: Allen Park

Day	Category 1	2	3	4	5	6	Tot
1	0	0	29	19	0	0	48
2	0	0	29	19	0	0	48
3	0	0	29	19	0	0	48
4	0	0	29	19	0	0	48
5	0	0	29	19	0	0	48
6	0	0	29	19	0	0	48
7	0	0	29	16	0	0	45
8	0	0	29	0	0	0	29
9	0	0	29	0	0	0	29
10	0	0	29	0	0	0	29
11	0	0	29	0	0	0	29
12	0	0	29	0	0	16	45
13	0	0	29	0	0	10	39
14	0	0	29	0	0	0	29
15	0	0	29	0	0	0	29
16	0	0	29	0	0	0	29
17	0	0	29	0	0	0	29
18	0	0	21	0	0	0	21
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	29	0	0	0	29
30	0	0	29	0	0	0	29
31	0	0	29	0	0	0	29
32	0	0	29	0	0	0	29
33	0	0	29	0	0	0	29
34	0	0	29	0	0	0	29
35	0	0	29	0	0	0	29
36	0	0	29	0	0	0	29
37	0	0	29	0	0	0	29
38	0	0	29	0	0	0	29
39	0	0	29	0	0	0	29
40	0	0	29	0	0	0	29
41	0	0	29	0	0	0	29
42	0	0	29	0	0	0	29
43	0	0	29	0	0	0	29
44	0	0	29	0	0	0	29
45	0	0	29	0	0	0	29
46	0	0	21	0	0	0	21
47	0	0	0	0	0	0	0

48	0	0	0	0	0	0	0
49	0	0	0	0	0	16	16
50	0	0	0	19	0	10	29
51	0	0	0	19	0	0	19
52	0	0	0	19	0	0	19
53	0	0	0	19	0	0	19
54	0	0	0	19	0	0	19
55	0	0	0	19	0	0	19
56	0	0	0	16	0	0	16
57	0	0	29	0	0	0	29
58	0	0	29	0	0	0	29
59	0	0	29	0	0	0	29
60	0	0	29	0	0	0	29
61	0	0	29	0	0	0	29
62	0	0	29	0	0	0	29
63	0	0	29	0	0	0	29
64	0	0	29	0	0	0	29
65	0	0	29	0	0	0	29
66	0	0	29	0	0	0	29
67	0	0	29	0	0	0	29
68	0	0	29	0	0	0	29
69	0	0	29	0	0	0	29
70	0	0	29	0	0	0	29
71	0	0	29	0	0	0	29
72	0	0	29	0	0	0	29
73	0	0	29	0	0	0	29
74	0	0	21	0	0	0	21
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	29	0	0	0	29
86	0	0	29	0	0	16	45
87	0	0	29	0	0	10	39
88	0	0	29	0	0	0	29
89	0	0	29	0	0	0	29
90	0	0	29	0	0	0	29

Airport: Offut AFB

Day	Category 1	2	3	4	5	6	Tot
1	0	0	7	26	0	0	33
2	0	0	7	26	0	0	33
3	0	0	7	26	0	0	33
4	0	0	7	26	0	0	33
5	0	0	7	26	0	0	33
6	0	0	7	26	0	0	33
7	0	0	7	22	0	0	29
8	0	0	7	0	0	0	7
9	0	0	7	0	0	0	7
10	0	0	7	0	0	0	7
11	0	0	7	0	0	0	7
12	0	0	7	0	0	0	7
13	0	0	7	0	0	10	17
14	0	0	7	0	0	6	13
15	0	0	7	0	0	0	7
16	0	0	7	0	0	0	7
17	0	0	7	0	0	0	7
18	0	0	7	0	0	0	7
19	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	7	0	0	0	7
30	0	0	7	0	0	0	7
31	0	0	7	0	0	0	7
32	0	0	7	0	0	0	7
33	0	0	7	0	0	0	7
34	0	0	7	0	0	0	7
35	0	0	7	0	0	0	7
36	0	0	7	0	0	0	7
37	0	0	7	0	0	0	7
38	0	0	7	0	0	0	7
39	0	0	7	0	0	0	7
40	0	0	7	0	0	0	7
41	0	0	7	0	0	0	7
42	0	0	7	0	0	0	7
43	0	0	7	0	0	0	7
44	0	0	7	0	0	0	7
45	0	0	7	0	0	0	7
46	0	0	7	0	0	0	7
47	0	0	0	0	0	0	0

48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	26	0	10	36
51	0	0	0	26	0	6	32
52	0	0	0	26	0	0	26
53	0	0	0	26	0	0	26
54	0	0	0	26	0	0	26
55	0	0	0	26	0	0	26
56	0	0	0	22	0	0	22
57	0	0	7	0	0	0	7
58	0	0	7	0	0	0	7
59	0	0	7	0	0	0	7
60	0	0	7	0	0	0	7
61	0	0	7	0	0	0	7
62	0	0	7	0	0	0	7
63	0	0	7	0	0	0	7
64	0	0	7	0	0	0	7
65	0	0	7	0	0	0	7
66	0	0	7	0	0	0	7
67	0	0	7	0	0	0	7
68	0	0	7	0	0	0	7
69	0	0	7	0	0	0	7
70	0	0	7	0	0	0	7
71	0	0	7	0	0	0	7
72	0	0	7	0	0	0	7
73	0	0	7	0	0	0	7
74	0	0	7	0	0	0	7
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	7	0	0	0	7
86	0	0	7	0	0	0	7
87	0	0	7	0	0	10	17
88	0	0	7	0	0	6	13
89	0	0	7	0	0	0	7
90	0	0	7	0	0	0	7

Airport: Wright-Patterson AFB

Day	Category 1	2	3	4	5	6	Tot
1	0	0	50	47	0	0	97
2	0	0	50	47	0	0	97
3	0	0	50	47	0	0	97
4	0	0	50	47	0	0	97
5	0	0	50	47	0	5	102
6	0	0	50	47	0	20	117
7	0	0	50	36	0	20	106
8	0	0	50	0	0	20	70
9	0	0	50	0	0	20	70
10	0	0	50	0	0	11	61
11	0	0	50	0	0	0	50
12	0	0	50	0	0	0	50
13	0	0	50	0	0	0	50
14	0	0	50	0	0	0	50
15	0	0	50	0	0	0	50
16	0	0	50	0	0	0	50
17	0	0	50	0	0	0	50
18	0	0	30	0	5	0	35
19	0	0	0	0	5	0	5
20	0	0	0	0	5	0	5
21	0	0	0	0	5	0	5
22	0	0	0	0	5	0	5
23	0	0	0	0	5	0	5
24	0	0	0	0	5	0	5
25	0	0	0	0	5	0	5
26	0	0	0	0	5	0	5
27	0	0	0	0	5	0	5
28	0	0	0	0	5	0	5
29	0	0	50	0	5	0	55
30	0	0	50	0	5	0	55
31	0	0	50	0	5	0	55
32	0	0	50	0	5	0	55
33	0	0	50	0	5	0	55
34	0	0	50	0	0	0	50
35	0	0	50	0	0	0	50
36	0	0	50	0	0	0	50
37	0	0	50	0	0	0	50
38	0	0	50	0	0	0	50
39	0	0	50	0	0	0	50
40	0	0	50	0	0	0	50
41	0	0	50	0	0	0	50
42	0	0	50	0	0	5	55
43	0	0	50	0	0	20	70
44	0	0	50	0	0	20	70
45	0	0	50	0	0	20	70
46	0	0	30	0	0	20	50
47	0	0	0	0	0	11	11

48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	47	0	0	47
51	0	0	0	47	5	0	52
52	0	0	0	47	5	0	52
53	0	0	0	47	5	0	52
54	0	0	0	47	5	0	52
55	0	0	0	47	5	0	52
56	0	0	0	36	5	0	41
57	0	0	50	0	5	0	55
58	0	0	50	0	5	0	55
59	0	0	50	0	5	0	55
60	0	0	50	0	5	0	55
61	0	0	50	0	5	0	55
62	0	0	50	0	5	0	55
63	0	0	50	0	5	0	55
64	0	0	50	0	5	0	55
65	0	0	50	0	5	0	55
66	0	0	50	0	5	0	55
67	0	0	50	0	0	0	50
68	0	0	50	0	0	0	50
69	0	0	50	0	0	0	50
70	0	0	50	0	0	0	50
71	0	0	50	0	0	0	50
72	0	0	50	0	0	0	50
73	0	0	50	0	0	0	50
74	0	0	30	0	0	0	30
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	5	5
80	0	0	0	0	0	20	20
81	0	0	0	0	0	20	20
82	0	0	0	0	0	20	20
83	0	0	0	0	0	20	20
84	0	0	0	0	5	11	16
85	0	0	50	0	5	0	55
86	0	0	50	0	5	0	55
87	0	0	50	0	5	0	55
88	0	0	50	0	5	0	55
89	0	0	50	0	5	0	55
90	0	0	50	0	5	0	55

Heuristic Calculations

Applicable Days: 1-4

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KORD-KDTW-KORD	0	0	2.83	-	Feasible/Select
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KDSM-KORD	>0	0	3.31	-	
KORD-KMCI-KORD	>0	0	3.93	-	
KORD-KIND-KORD	>0	0	2.11	-	
KORD-KLEX-KORD	0	>0	3.06	-	Feasible/Select
KORD-KMSP-KORD	>0	0	3.42	-	
KORD-KOFF-KORD	>0	0	4.08	-	
KORD-KBLV-KORD	0	>0	2.60	-	Feasible/Select
KORD-KFFO-KORD	0	>0	2.84	-	Feasible/Select
KORD-KLEX-KORD	>0	0	3.06	-	
KORD-KBLV-KORD	0	>0	2.60	-	Feasible/Select
KORD-KFFO-KORD	0	>0	2.84	-	Feasible/Select
KORD-KBLV-KORD	>0	0	2.60	-	
KORD-KFFO-KORD	>0	0	2.84	-	
KORD-KCLE-KDSM -KORD	>0	0	6.74	0	
KORD-KCLE-KMCI -KORD	0	>0	7.30	.06	
KORD-KCLE-KIND -KORD	>0	0	4.72	.82	
KORD-KCLE-KLEX -KORD	>0	0	5.12	1.37	
KORD-KCLE-KMSP -KORD	0	>0	6.81	.04	
KORD-KCLE-KOFF -KORD	0	>0	7.50	.01	
KORD-KCLE-KBLV -KORD	>0	0	5.67	.36	
KORD-KCLE-KFFO -KORD	>0	0	4.72	1.55	
KORD-KDSM-KMCI -KORD	>0	0	5.12	2.12	
KORD-KDSM-KIND -KORD	>0	0	5.23	.19	
KORD-KDSM-KLEX -KORD	>0	0	6.13	.24	
KORD-KDSM-KMSP -KORD	>0	0	5.04	1.69	
KORD-KDSM-KOFF					

-KORD	>0	0	5.09	2.30	Feasible/Combine
KORD-KDSM-KBLV -KORD	>0	0	5.01	.90	
KORD-KDSM-KFFO -KORD	>0	0	6.05	.10	
KORD-KMCI-KIND -KORD	>0	0	5.72	.32	
KORD-KMCI-KLEX -KORD	>0	0	6.54	.45	
KORD-KMCI-KMSP -KORD	0	>0	5.84	1.51	
KORD-KMCI-KOFF -KORD	0	>0	5.40	2.61	
KORD-KMCI-KBLV -KORD	0	0	5.33	1.20	
KORD-KMCI-KFFO -KORD	>0	0	6.53	.24	
KORD-KIND-KMSP -KORD	>0	0	5.50	.03	
KORD-KIND-KLEX -KORD	>0	0	4.06	1.11	
KORD-KIND-KOFF -KORD	>0	0	5.97	.22	
KORD-KIND-KBLV -KORD	>0	0	4.06	.65	
KORD-KIND-KFFO -KORD	>0	0	3.93	1.02	
KORD-KLEX-KMSP -KORD	>0	0	6.44	.04	
KORD-KLEX-KOFF -KORD	>0	0	6.84	.30	
KORD-KLEX-KBLV -KORD	>0	0	4.81	.85	
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	
KORD-KMSP-KOFF -KORD	0	>0	5.64	1.86	
KORD-KMSP-KBLV -KORD	>0	0	5.52	.50	
KORD-KMSP-KFFO -KORD	>0	0	6.26	0	
KORD-KOFF-KBLV -KORD	>0	0	5.67	1.01	
KORD-KOFF-KFFO -KORD	>0	0	6.79	.13	
KORD-KBLV-KFFO -KORD	>0	0	4.84	.60	
KORD-KDSM-KOFF -KMSP-KORD	0	>0	6.65	1.86	

KORD-KDSM-KOFF -KBLV-KORD	0	>0	6.67	1.02	
KORD-KDSM-KOFF -KIND-KORD	0	>0	6.98	.22	
KORD-KDSM-KOFF -KMCI-KORD	0	>0	6.40	2.62	
KORD-KDSM-KOFF -KLEX-KORD	>0	0	7.85	.30	
KORD-KDSM-KOFF -KFFO-KORD	>0	0	7.79	.14	
KORD-KDSM-KOFF -KCLE-KORD	0	>0	8.51	.01	
KORD-KFFO-KLEX -KORD	>0	0	4.26	1.64	Feasible/Combine
KORD-KFFO-KLEX -KIND-KORD	>0	0	5.27	1.10	
KORD-KLEX-KFFO -KCLE-KORD	>0	0	6.14	1.55	Feasible/Combine
KORD-KFFO-KLEX -KBLV-KORD	>0	0	6.02	.84	
KORD-KDSM-KOFF -KORD	>0	0	5.09	2.30	Feasible/Select
KORD-KCLE-KFFO -KLEX-KIND-KORD	>0	0	7.14	1.11	Feasible/Select
KORD-KMCI-KBLV -KORD	0	0	5.33	1.20	Feasible/Select
KORD-KMSP-KORD	>0	0	3.42	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KORD-KFFO-KORD
KORD-KFFO-KORD
KORD-KBLV-KORD
KORD-KBLV-KORD
KORD-KLEX-KORD
KORD-KDTW-KORD
KORD-KMSP-KORD
KORD-KDSM-KOFF-KORD
KORD-KMCI-KBLV-KORD
KORD-KCLE-KFFO-KLEX-KIND-KORD

Total Time: 37.75
Aircraft Required: 6

Applicable Days: 5

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KORD-KDTW-KORD	0	0	2.83	-	Feasible/Select
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KDSM-KORD	>0	0	3.31	-	
KORD-KMCI-KORD	>0	0	3.93	-	
KORD-KIND-KORD	>0	0	2.11	-	
KORD-KLEX-KORD	0	>0	3.06	-	Feasible/Select
KORD-KMSP-KORD	>0	0	3.42	-	
KORD-KOFF-KORD	>0	0	4.08	-	
KORD-KBLV-KORD	0	>0	2.60	-	Feasible/Select
KORD-KFFO-KORD	0	>0	2.84	-	Feasible/Select
KORD-KLEX-KORD	>0	0	3.06	-	
KORD-KBLV-KORD	0	>0	2.60	-	Feasible/Select
KORD-KFFO-KORD	0	>0	2.84	-	Feasible/Select
KORD-KBLV-KORD	>0	0	2.60	-	
KORD-KFFO-KORD	>0	0	2.84	-	
KORD-KCLE-KDSM -KORD	>0	0	6.74	0	
KORD-KCLE-KMCI -KORD	0	>0	7.30	.06	
KORD-KCLE-KIND -KORD	>0	0	4.72	.82	
KORD-KCLE-KLEX -KORD	>0	0	5.12	1.37	
KORD-KCLE-KMSP -KORD	0	>0	6.81	.04	
KORD-KCLE-KOFF -KORD	0	>0	7.50	.01	
KORD-KCLE-KBLV -KORD	>0	0	5.67	.36	
KORD-KCLE-KFFO -KORD	>0	0	4.72	1.55	
KORD-KDSM-KMCI -KORD	>0	0	5.12	2.12	
KORD-KDSM-KIND -KORD	>0	0	5.23	.19	
KORD-KDSM-KLEX -KORD	>0	0	6.13	.24	
KORD-KDSM-KMSP -KORD	>0	0	5.04	1.69	
KORD-KDSM-KOFF -KORD	>0	0	5.09	2.30	Feasible/Combine

KORD-KDSM-KBLV -KORD	>0	0	5.01	.90
KORD-KDSM-KFFO -KORD	>0	0	6.05	.10
KORD-KMCI-KIND -KORD	>0	0	5.72	.32
KORD-KMCI-KLEX -KORD	>0	0	6.54	.45
KORD-KMCI-KMSP -KORD	0	>0	5.84	1.51
KORD-KMCI-KOFF -KORD	0	>0	5.40	2.61
KORD-KMCI-KBLV -KORD	0	0	5.33	1.20
KORD-KMCI-KFFO -KORD	>0	0	6.53	.24
KORD-KIND-KMSP -KORD	>0	0	5.50	.03
KORD-KIND-KLEX -KORD	>0	0	4.06	1.11
KORD-KIND-KOFF -KORD	>0	0	5.97	.22
KORD-KIND-KBLV -KORD	>0	0	4.06	.65
KORD-KIND-KFFO -KORD	>0	0	3.93	1.02
KORD-KLEX-KMSP -KORD	>0	0	6.44	.04
KORD-KLEX-KOFF -KORD	>0	0	6.84	.30
KORD-KLEX-KBLV -KORD	>0	0	4.81	.85
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64
KORD-KMSP-KOFF -KORD	0	>0	5.64	1.86
KORD-KMSP-KBLV -KORD	>0	0	5.52	.50
KORD-KMSP-KFFO -KORD	>0	0	6.26	0
KORD-KOFF-KBLV -KORD	>0	0	5.67	1.01
KORD-KOFF-KFFO -KORD	>0	0	6.79	.13
KORD-KBLV-KFFO -KORD	>0	0	4.84	.60
KORD-KDSM-KOFF -KMSP-KORD	0	>0	6.65	1.86
KORD-KDSM-KOFF -KBLV-KORD	0	>0	6.67	1.02

KORD-KDSM-KOFF -KIND-KORD	0	>0	6.98	.22	
KORD-KDSM-KOFF -KMCI-KORD	0	>0	6.40	2.62	
KORD-KDSM-KOFF -KLEX-KORD	>0	0	7.85	.30	
KORD-KDSM-KOFF -KFFO-KORD	>0	0	7.79	.14	
KORD-KDSM-KOFF -KCLE-KORD	0	>0	8.51	.01	
KORD-KFFO-KLEX -KORD	>0	0	4.26	1.64	Feasible/Combine
KORD-KFFO-KLEX -KIND-KORD	>0	0	5.27	1.10	
KORD-KLEX-KFFO -KCLE-KORD	>0	0	6.14	1.55	Feasible/Combine
KORD-KFFO-KLEX -KBLV-KORD	>0	0	6.02	.84	
KORD-KDSM-KOFF -KORD	>0	0	5.09	2.30	Feasible/Select
KORD-KCLE-KFFO -KLEX-KIND-KORD	0	>0	7.14	1.11	Unfeasible/Cap
KORD-KLEX-KFFO -KCLE-KORD	>0	0	6.14	1.55	Feasible/Select
KORD-KMCI-KBLV -KORD	0	0	5.33	1.20	Feasible/Select
KORD-KMSP-KIND -KORD	>0	0	5.50	.03	Feasible/Select

<u>Split Delivery Calculations</u>

Route	C	U	T	S	Remarks
KORD-KCLE-KFFO -KLEX-KIND-KORD + KORD-KDSM -KOFF-KIND-KORD	0	0	14.12	-.81	No Savings

<u>Selected Routes</u>

KORD-KFFO-KORD
KORD-KFFO-KORD
KORD-KBLV-KORD
KORD-KBLV-KORD
KORD-KLEX-KORD
KORD-KDTW-KORD
KORD-KMSP-KIND-KORD

KORD-KDSM-KOFF-KORD
KORD-KMCI-KBLV-KORD
KORD-KCLE-KFFO-KLEX-KORD

Total Time: 38.83
Aircraft Required: 5

Applicable Days: 6

<u>Clarke-Wright Calculations</u>

Route	C	U	T	S	Remarks
KORD-KDTW-KORD	0	0	2.83	-	Feasible/Select
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KDSM-KORD	>0	0	3.31	-	
KORD-KMCI-KORD	>0	0	3.93	-	
KORD-KIND-KORD	>0	0	2.11	-	
KORD-KLEX-KORD	0	>0	3.06	-	Feasible/Select
KORD-KMSP-KORD	>0	0	3.42	-	
KORD-KOFF-KORD	>0	0	4.08	-	
KORD-KBLV-KORD	0	>0	2.60	-	Feasible/Select
KORD-KFFO-KORD	0	>0	2.84	-	Feasible/Select
KORD-KLEX-KORD	>0	0	3.06	-	
KORD-KBLV-KORD	0	>0	2.60	-	Feasible/Select
KORD-KFFO-KORD	0	>0	2.84	-	Feasible/Select
KORD-KBLV-KORD	>0	0	2.60	-	
KORD-KFFO-KORD	>0	0	2.84	-	
KORD-KCLE-KDSM -KORD	>0	0	6.74	0	
KORD-KCLE-KMCI -KORD	0	>0	7.30	.06	
KORD-KCLE-KIND -KORD	>0	0	4.72	.82	
KORD-KCLE-KLEX -KORD	>0	0	5.12	1.37	
KORD-KCLE-KMSP -KORD	0	>0	6.81	.04	
KORD-KCLE-KOFF -KORD	0	>0	7.50	.01	
KORD-KCLE-KBLV -KORD	>0	0	5.67	.36	
KORD-KCLE-KFFO					

-KORD	>0	0	4.72	1.55	
KORD-KDSM-KMCI -KORD	>0	0	5.12	2.12	
KORD-KDSM-KIND -KORD	>0	0	5.23	.19	
KORD-KDSM-KLEX -KORD	>0	0	6.13	.24	
KORD-KDSM-KMSP -KORD	>0	0	5.04	1.69	
KORD-KDSM-KOFF -KORD	>0	0	5.09	2.30	Feasible/Combine
KORD-KDSM-KBLV -KORD	>0	0	5.01	.90	
KORD-KDSM-KFFO -KORD	>0	0	6.05	.10	
KORD-KMCI-KIND -KORD	>0	0	5.72	.32	
KORD-KMCI-KLEX -KORD	>0	0	6.54	.45	
KORD-KMCI-KMSP -KORD	0	>0	5.84	1.51	
KORD-KMCI-KOFF -KORD	0	>0	5.40	2.61	
KORD-KMCI-KBLV -KORD	0	0	5.33	1.20	
KORD-KMCI-KFFO -KORD	>0	0	6.53	.24	
KORD-KIND-KMSP -KORD	>0	0	5.50	.03	
KORD-KIND-KLEX -KORD	>0	0	4.06	1.11	
KORD-KIND-KOFF -KORD	>0	0	5.97	.22	
KORD-KIND-KBLV -KORD	>0	0	4.06	.65	
KORD-KIND-KFFO -KORD	>0	0	3.93	1.02	
KORD-KLEX-KMSP -KORD	>0	0	6.44	.04	
KORD-KLEX-KOFF -KORD	>0	0	6.84	.30	
KORD-KLEX-KBLV -KORD	>0	0	4.81	.85	
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	
KORD-KMSP-KOFF -KORD	0	>0	5.64	1.86	
KORD-KMSP-KBLV -KORD	>0	0	5.52	.50	
KORD-KMSP-KFFO					

-KORD	>0	0	6.26	0	
KORD-KOFF-KBLV -KORD	>0	0	5.67	1.01	
KORD-KOFF-KFFO -KORD	>0	0	6.79	.13	
KORD-KBLV-KFFO -KORD	>0	0	4.84	.60	
KORD-KDSM-KOFF -KMSP-KORD	0	>0	6.65	1.86	
KORD-KDSM-KOFF -KBLV-KORD	0	>0	6.67	1.02	
KORD-KDSM-KOFF -KIND-KORD	0	>0	6.98	.22	
KORD-KDSM-KOFF -KMCI-KORD	0	>0	6.40	2.62	
KORD-KDSM-KOFF -KLEX-KORD	>0	0	7.85	.30	
KORD-KDSM-KOFF -KFFO-KORD	>0	0	7.79	.14	
KORD-KDSM-KOFF -KCLE-KORD	0	>0	8.51	.01	
KORD-KFFO-KLEX -KORD	>0	0	4.26	1.64	Feasible/Combine
KORD-KFFO-KLEX -KIND-KORD	>0	0	5.27	1.10	Feasible/Combine
KORD-KLEX-KFFO -KCLE-KORD	0	>0	6.14	1.55	Unfeasible/Cap
KORD-KFFO-KLEX -KBLV-KORD	>0	0	6.02	.84	
KORD-KDSM-KOFF -KORD	>0	0	5.09	2.30	Feasible/Select
KORD-KMCI-KBLV -KORD	0	0	5.33	1.20	Feasible/Select
KORD-KFFO-KLEX -KIND-KORD	>0	0	5.27	1.10	Feasible/Select
KORD-KCLE-KMSP -KORD	0	>0	6.81	.04	Unfeasible/Cap
KORD-KMSP-KORD	>0	0	3.42	-	Feasible/Select
KORD-KCLE-KORD	>0	0	3.43	-	Feasible/Select

Split Delivery Calculations

Route	C	U	T	S	Remarks
KORD-KMSP-KCLE					

-KORD + KORD -KIND-KLEX-KFFO -KCLE-KORD	0	0	13.95	-1.83	No Savings

Selected Routes

KORD-KFFO-KORD
KORD-KFFO-KORD
KORD-KBLV-KORD
KORD-KBLV-KORD
KORD-KLEX-KORD
KORD-KDTW-KORD
KORD-KMSP-KORD
KORD-KCLE-KORD
KORD-KDSM-KOFF-KORD
KORD-KMCI-KBLV-KORD
KORD-KFFO-KLEX-KIND-KORD

Total Time: 39.31
Aircraft Required: 6

Applicable Days: 7

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KORD-KDTW-KORD	>0	0	2.83	-	
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KDSM-KORD	>0	0	3.31	-	
KORD-KMCI-KORD	>0	0	3.93	-	
KORD-KIND-KORD	>0	0	2.11	-	
KORD-KLEX-KORD	>0	0	3.06	-	
KORD-KMSP-KORD	>0	0	3.42	-	
KORD-KOFF-KORD	>0	0	4.08	-	
KORD-KBLV-KORD	0	>0	2.60	-	Feasible/Select
KORD-KFFO-KORD	0	>0	2.84	-	Feasible/Select
KORD-KBLV-KORD	0	>0	2.60	-	Feasible/Select
KORD-KFFO-KORD	0	>0	2.84	-	Feasible/Select
KORD-KBLV-KORD	>0	0	2.60	-	
KORD-KFFO-KORD	>0	0	2.84	-	
KORD-KDTW-KCLE -KORD	0	>0	4.47	1.79	
KORD-KDTW-KDSM -KORD	0	>0	6.14	0	
KORD-KDTW-KMCI -KORD	0	>0	6.73	.03	

KORD-KDTW-KIND -KORD	0	>0	4.24	.70	
KORD-KDTW-KLEX -KORD	0	>0	4.82	1.07	
KORD-KDTW-KMSP -KORD	0	>0	6.17	.08	
KORD-KDTW-KOFF -KORD	0	>0	6.91	0	
KORD-KDTW-KBLV -KORD	>0	0	5.17	.26	
KORD-KDTW-KFFO -KORD	0	>0	4.39	1.28	
KORD-KCLE-KDSM -KORD	>0	0	6.74	0	
KORD-KCLE-KMCI -KORD	0	>0	7.30	.06	
KORD-KCLE-KIND -KORD	>0	0	4.72	.82	
KORD-KCLE-KLEX -KORD	0	>0	5.12	1.37	
KORD-KCLE-KMSP -KORD	0	>0	6.81	.04	
KORD-KCLE-KOFF -KORD	0	>0	7.50	.01	
KORD-KCLE-KBLV -KORD	>0	0	5.67	.36	
KORD-KCLE-KFFO -KORD	>0	0	4.72	1.55	
KORD-KDSM-KMCI -KORD	>0	0	5.12	2.12	
KORD-KDSM-KIND -KORD	>0	0	5.23	.19	
KORD-KDSM-KLEX -KORD	>0	0	6.13	.24	
KORD-KDSM-KMSP -KORD	>0	0	5.04	1.69	
KORD-KDSM-KOFF -KORD	>0	0	5.09	2.30	Feasible/Combine
KORD-KDSM-KBLV -KORD	>0	0	5.01	.90	
KORD-KDSM-KFFO -KORD	>0	0	6.05	.10	
KORD-KMCI-KIND -KORD	>0	0	5.72	.32	
KORD-KMCI-KLEX -KORD	0	>0	6.54	.45	
KORD-KMCI-KMSP -KORD	0	>0	5.84	1.51	
KORD-KMCI-KOFF -KORD	0	>0	5.40	2.61	Unfeasible/Cap
KORD-KMCI-KBLV					

-KORD	>0	0	5.33	1.20	
KORD-KMCI-KFFO -KORD	>0	0	6.53	.24	
KORD-KIND-KMSP -KORD	>0	0	5.50	.03	
KORD-KIND-KLEX -KORD	0	0	4.06	1.11	
KORD-KIND-KOFF -KORD	>0	0	5.97	.22	
KORD-KIND-KBLV -KORD	>0	0	4.06	.65	
KORD-KIND-KFFO -KORD	>0	0	3.93	1.02	
KORD-KLEX-KMSP -KORD	0	>0	6.44	.04	
KORD-KLEX-KOFF -KORD	0	>0	6.84	.30	
KORD-KLEX-KBLV -KORD	>0	0	4.81	.85	
KORD-KLEX-KFFO -KORD	0	>0	4.26	1.64	
KORD-KMSP-KOFF -KORD	0	>0	5.64	1.86	
KORD-KMSP-KBLV -KORD	>0	0	5.52	.50	
KORD-KMSP-KFFO -KORD	>0	0	6.26	0	
KORD-KOFF-KBLV -KORD	>0	0	5.67	1.01	
KORD-KOFF-KFFO -KORD	>0	0	6.79	.13	
KORD-KBLV-KFFO -KORD	>0	0	4.84	.60	
KORD-KDSM-KOFF -KMSP-KORD	0	>0	6.65	1.86	Unfeasible/Cap
KORD-KDSM-KOFF -KBLV-KORD	0	>0	6.67	1.02	
KORD-KDSM-KOFF -KIND-KORD	0	>0	6.98	.22	
KORD-KDSM-KOFF -KMCI-KORD	0	>0	6.40	2.62	Unfeasible/Cap
KORD-KDSM-KOFF -KLEX-KORD	>0	0	7.85	.30	
KORD-KDSM-KOFF -KFFO-KORD	>0	0	7.79	.14	
KORD-KDSM-KOFF -KCLE-KORD	0	>0	8.51	.01	
KORD-KDTW-KCLE					

-KORD	0	>0	4.47	1.79	Unfeasible/Cap
KORD-KFFO-KLEX -KORD	0	>0	4.26	1.64	Unfeasible/Cap
KORD-KCLE-KFFO -KORD	>0	0	4.72	1.55	Feasible/Combine
KORD-KDSM-KOFF -KORD	>0	0	5.09	2.30	Feasible/Select
KORD-KCLE-KFFO -KIND	0	>0	5.81	1.02	
KORD-KMCI-KBLV -KORD	>0	0	5.33	1.20	Feasible/Combine
KORD-KCLE-KFFO -KORD	>0	0	4.72	1.55	Feasible/Select
KORD-KMCI-KBLV -KIND-KORD	>0	0	6.79	.65	
KORD-KIND-KLEX -KORD	0	>0	4.06	1.11	Feasible/Select
KORD-KMCI-KBLV -KORD	>0	0	5.33	1.20	Feasible/Select
KORD-KDTW-KMSP -KORD	0	>0	6.17	.08	Unfeasible/Cap
KORD-KMSP-KORD	>0	0	3.42	-	Feasible/Select
KORD-KDTW-KORD	>0	0	2.83	-	Feasible/Select

<u>Split Delivery Calculations</u>

Route	C	U	T	S	Remarks
KORD-KBLV-KMCI -KOFF-KORD + KORD-KOFF-KDSM -KMSP + KORD -KMSP-KDTW-KORD	0	0	19.61	-2.94	No Savings

<u>Selected Routes</u>

KORD-KFFO-KORD
KORD-KFFO-KORD
KORD-KBLV-KORD
KORD-KBLV-KORD
KORD-KDTW-KORD
KORD-KMSP-KORD
KORD-KDSM-KOFF-KORD

KORD-KBLV-KMCI-KORD
KORD-KCLE-KFFO-KORD
KORD-KLEX-KIND-KORD

Total Time: 36.33
Aircraft Required: 5

Applicable Days: 8-9, 43-45

<u>Clarke-Wright Calculations</u>

Route	C	U	T	S	Remarks
KORD-KDTW-KORD	>0	0	2.83	-	
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KDSM-KORD	>0	0	3.31	-	
KORD-KMCI-KORD	>0	0	3.93	-	
KORD-KIND-KORD	>0	0	2.11	-	
KORD-KLEX-KORD	>0	0	3.06	-	
KORD-KMSP-KORD	>0	0	3.42	-	
KORD-KOFF-KORD	>0	0	4.08	-	
KORD-KBLV-KORD	0	>0	2.60	-	Feasible/Select
KORD-KFFO-KORD	0	>0	2.84	-	Feasible/Select
KORD-KBLV-KORD	>0	0	2.60	-	
KORD-KFFO-KORD	>0	0	2.84	-	
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	
KORD-KDTW-KDSM -KORD	>0	0	6.14	0	
KORD-KDTW-KMCI -KORD	0	>0	6.73	.03	
KORD-KDTW-KIND -KORD	>0	0	4.24	.70	
KORD-KDTW-KLEX -KORD	0	>0	4.82	1.07	
KORD-KDTW-KMSP -KORD	0	>0	6.17	.08	
KORD-KDTW-KOFF -KORD	>0	0	6.91	0	
KORD-KDTW-KBLV -KORD	0	>0	5.17	.26	
KORD-KDTW-KFFO -KORD	0	>0	4.39	1.28	
KORD-KCLE-KDSM					

-KORD	>0	0	6.74	0	
KORD-KCLE-KMCI -KORD	>0	0	7.30	.06	
KORD-KCLE-KIND -KORD	>0	0	4.72	.82	
KORD-KCLE-KLEX -KORD	>0	0	5.12	1.37	
KORD-KCLE-KMSP -KORD	>0	0	6.81	.04	
KORD-KCLE-KOFF -KORD	>0	0	7.50	.01	
KORD-KCLE-KBLV -KORD	>0	0	5.67	.36	
KORD-KCLE-KFFO -KORD	>0	0	4.72	1.55	
KORD-KDSM-KMCI -KORD	>0	0	5.12	2.12	
KORD-KDSM-KIND -KORD	>0	0	5.23	.19	
KORD-KDSM-KLEX -KORD	>0	0	6.13	.24	
KORD-KDSM-KMSP -KORD	>0	0	5.04	1.69	
KORD-KDSM-KOFF -KORD	>0	0	5.09	2.30	
KORD-KDSM-KBLV -KORD	>0	0	5.01	.90	
KORD-KDSM-KFFO -KORD	>0	0	6.05	.10	
KORD-KMCI-KIND -KORD	>0	0	5.72	.32	
KORD-KMCI-KLEX -KORD	>0	0	6.54	.45	
KORD-KMCI-KMSP -KORD	>0	0	5.84	1.51	
KORD-KMCI-KOFF -KORD	>0	0	5.40	2.61	Feasible/Combine
KORD-KMCI-KBLV -KORD	>0	0	5.33	1.20	
KORD-KMCI-KFFO -KORD	>0	0	6.53	.24	
KORD-KIND-KMSP -KORD	>0	0	5.50	.03	
KORD-KIND-KLEX -KORD	>0	0	4.06	1.11	
KORD-KIND-KOFF -KORD	>0	0	5.97	.22	
KORD-KIND-KBLV -KORD	>0	0	4.06	.65	
KORD-KIND-KFFO					

-KORD	>0	0	3.93	1.02	
KORD-KLEX-KMSP -KORD	>0	0	6.44	.04	
KORD-KLEX-KOFF -KORD	>0	0	6.84	.30	
KORD-KLEX-KBLV -KORD	>0	0	4.81	.85	
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	
KORD-KMSP-KOFF -KORD	>0	0	5.64	1.86	
KORD-KMSP-KBLV -KORD	>0	0	5.52	.50	
KORD-KMSP-KFFO -KORD	>0	0	6.26	0	
KORD-KOFF-KBLV -KORD	>0	0	5.67	1.01	
KORD-KOFF-KFFO -KORD	>0	0	6.79	.13	
KORD-KBLV-KFFO -KORD	>0	0	4.84	.60	
KORD-KDSM-KOFF -KMCI-KORD	>0	0	6.40	2.62	Feasible/Combine
KORD-KDSM-KOFF -KMCI-KIND-KORD	>0	0	8.19	.32	
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	Feasible/Combine
KORD-KDSM-KOFF -KMCI-KORD	>0	0	6.40	2.62	Feasible/Select
KORD-KDTW-KCLE -KIND-KORD	>0	0	5.76	.82	
KORD-KFFO-KLEX -KORD	>0	0	4.26	1.64	Feasible/Select
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	Feasible/Select
KORD-KIND-KMSP -KORD	>0	0	5.50	.03	
KORD-KIND-KBLV -KORD	>0	0	4.06	.65	Feasible/Select
KORD-KMSP-KBLV -KORD	>0	0	5.52	.50	
KORD-KMSP-KORD	>0	0	3.42	-	Feasible/Select

Split Delivery Calculations

Route	C	U	T	S	Remarks
KORD-KMCI-KDSM -KMSP-KORD + KORD-KCLE-KDTW -KMSP-KORD	0	0	15.94	-1.65	No Savings

Selected Routes

KORD-KMSP-KORD
KORD-KFFO-KORD
KORD-KBLV-KORD
KORD-KBLV-KIND-KORD
KORD-KFFO-KLEX-KORD
KORD-KCLE-KDTW-KORD
KORD-KDSM-KOFF-KMCI-KORD

Total Time: 28.05
Aircraft Required: 4

Applicable Days: 10-11, 85-86

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KORD-KDTW-KORD	>0	0	2.83	-	
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KDSM-KORD	>0	0	3.31	-	
KORD-KMCI-KORD	>0	0	3.93	-	
KORD-KIND-KORD	>0	0	2.11	-	
KORD-KLEX-KORD	>0	0	3.06	-	
KORD-KMSP-KORD	>0	0	3.42	-	
KORD-KOFF-KORD	>0	0	4.08	-	
KORD-KBLV-KORD	0	>0	2.60	-	Feasible/Select
KORD-KFFO-KORD	0	>0	2.84	-	Feasible/Select
KORD-KBLV-KORD	>0	0	2.60	-	
KORD-KFFO-KORD	>0	0	2.84	-	
KORD-KDTW-KCLE -KORD	0	>0	4.47	1.79	
KORD-KDTW-KDSM -KORD	>0	0	6.14	0	
KORD-KDTW-KMCI					

-KORD	0	>0	6.73	.03
KORD-KDTW-KIND -KORD	>0	0	4.24	.70
KORD-KDTW-KLEX -KORD	0	>0	4.82	1.07
KORD-KDTW-KMSP -KORD	0	0	6.17	.08
KORD-KDTW-KOFF -KORD	>0	0	6.91	0
KORD-KDTW-KBLV -KORD	0	>0	5.17	.26
KORD-KDTW-KFFO -KORD	>0	0	4.39	1.28
KORD-KCLE-KDSM -KORD	>0	0	6.74	0
KORD-KCLE-KMCI -KORD	>0	0	7.30	.06
KORD-KCLE-KIND -KORD	>0	0	4.72	.82
KORD-KCLE-KLEX -KORD	>0	0	5.12	1.37
KORD-KCLE-KMSP -KORD	>0	0	6.81	.04
KORD-KCLE-KOFF -KORD	>0	0	7.50	.01
KORD-KCLE-KBLV -KORD	>0	0	5.67	.36
KORD-KCLE-KFFO -KORD	>0	0	4.72	1.55
KORD-KDSM-KMCI -KORD	>0	0	5.12	2.12
KORD-KDSM-KIND -KORD	>0	0	5.23	.19
KORD-KDSM-KLEX -KORD	>0	0	6.13	.24
KORD-KDSM-KMSP -KORD	>0	0	5.04	1.69
KORD-KDSM-KOFF -KORD	>0	0	5.09	2.30
KORD-KDSM-KBLV -KORD	>0	0	5.01	.90
KORD-KDSM-KFFO -KORD	>0	0	6.05	.10
KORD-KMCI-KIND -KORD	>0	0	5.72	.32
KORD-KMCI-KLEX -KORD	>0	0	6.54	.45
KORD-KMCI-KMSP -KORD	>0	0	5.84	1.51
KORD-KMCI-KOFF				

-KORD	>0	0	5.40	2.61	Feasible/Combine
KORD-KMCI-KBLV -KORD	>0	0	5.33	1.20	
KORD-KMCI-KFFO -KORD	>0	0	6.53	.24	
KORD-KIND-KMSP -KORD	>0	0	5.50	.03	
KORD-KIND-KLEX -KORD	>0	0	4.06	1.11	
KORD-KIND-KOFF -KORD	>0	0	5.97	.22	
KORD-KIND-KBLV -KORD	>0	0	4.06	.65	
KORD-KIND-KFFO -KORD	>0	0	3.93	1.02	
KORD-KLEX-KMSP -KORD	>0	0	6.44	.04	
KORD-KLEX-KOFF -KORD	>0	0	6.84	.30	
KORD-KLEX-KBLV -KORD	>0	0	4.81	.85	
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	
KORD-KMSP-KOFF -KORD	>0	0	5.64	1.86	
KORD-KMSP-KBLV -KORD	>0	0	5.52	.50	
KORD-KMSP-KFFO -KORD	>0	0	6.26	0	
KORD-KOFF-KBLV -KORD	>0	0	5.67	1.01	
KORD-KOFF-KFFO -KORD	>0	0	6.79	.13	
KORD-KBLV-KFFO -KORD	>0	0	4.84	.60	
KORD-KDSM-KOFF -KMCI-KORD	>0	0	6.40	2.62	Feasible/Combine
KORD-KDSM-KOFF -KMCI-KIND-KORD	>0	0	8.19	.32	
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	Feasible/Combine
KORD-KDSM-KOFF -KMCI-KORD	>0	0	6.40	2.62	Feasible/Select
KORD-KLEX-KFFO -KIND-KORD	>0	0	5.27	1.10	Feasible/Select

KORD-KDTW-KMSP -KORD	0	0	6.17	.08	
KORD-KCLE-KMSP -KORD	>0	0	6.81	.04	
KORD-KMSP-KBLV -KORD	>0	0	5.52	.50	Feasible/Select
KORD-KCLE-KBLV -KORD	>0	0	5.67	.36	
KORD-KDTW-KCLE -KORD	0	>0	4.47	1.79	Unfeasible/Cap
KORD-KDTW-KORD	>0	0	2.83	-	Feasible/Select
KORD-KCLE-KORD	>0	0	3.43	-	Feasible/Select

<u>Split Delivery Calculations</u>

Route	C	U	T	S	Remarks
KORD-KIND-KLEX -KFFO-KCLE-KORD + KORD-KDTW-KCLE -KORD	0	0	11.61	-.08	No Savings

<u>Selected Routes</u>

KORD-KFFO-KORD
KORD-KBLV-KORD
KORD-KDTW-KORD
KORD-KCLE-KORD
KORD-KBLV-KMSP-KORD
KORD-KDSM-KOFF-KMCI-KORD
KORD-KFFO-KLEX-KIND-KORD

Total Time: 28.89
Aircraft Required: 4

Applicable Days: 12, 87

<u>Clarke-Wright Calculations</u>

Route	C	U	T	S	Remarks
KORD-KDTW-KORD	>0	0	2.83	-	
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KDSM-KORD	>0	0	3.31	-	
KORD-KMCI-KORD	>0	0	3.93	-	
KORD-KIND-KORD	>0	0	2.11	-	
KORD-KLEX-KORD	>0	0	3.06	-	
KORD-KMSP-KORD	>0	0	3.42	-	

KORD-KOFF-KORD	>0	0	4.08	-	
KORD-KBLV-KORD	0	>0	2.60	-	Feasible/Select
KORD-KFFO-KORD	0	>0	2.84	-	Feasible/Select
KORD-KBLV-KORD	>0	0	2.60	-	
KORD-KFFO-KORD	>0	0	2.84	-	
KORD-KDTW-KCLE -KORD	0	>0	4.47	1.79	
KORD-KDTW-KDSM -KORD	0	>0	6.14	0	
KORD-KDTW-KMCI -KORD	0	>0	6.73	.03	
KORD-KDTW-KIND -KORD	0	>0	4.24	.70	
KORD-KDTW-KLEX -KORD	0	>0	4.82	1.07	
KORD-KDTW-KMSP -KORD	0	>0	6.17	.08	
KORD-KDTW-KOFF -KORD	0	>0	6.91	0	
KORD-KDTW-KBLV -KORD	0	>0	5.17	.26	
KORD-KDTW-KFFO -KORD	>0	0	4.39	1.28	
KORD-KCLE-KDSM -KORD	>0	0	6.74	0	
KORD-KCLE-KMCI -KORD	>0	0	7.30	.06	
KORD-KCLE-KIND -KORD	>0	0	4.72	.82	
KORD-KCLE-KLEX -KORD	>0	0	5.12	1.37	
KORD-KCLE-KMSP -KORD	>0	0	6.81	.04	
KORD-KCLE-KOFF -KORD	>0	0	7.50	.01	
KORD-KCLE-KBLV -KORD	>0	0	5.67	.36	
KORD-KCLE-KFFO -KORD	>0	0	4.72	1.55	
KORD-KDSM-KMCI -KORD	>0	0	5.12	2.12	
KORD-KDSM-KIND -KORD	>0	0	5.23	.19	
KORD-KDSM-KLEX -KORD	>0	0	6.13	.24	
KORD-KDSM-KMSP -KORD	>0	0	5.04	1.69	
KORD-KDSM-KOFF					

-KORD	>0	0	5.09	2.30	
KORD-KDSM-KBLV -KORD	>0	0	5.01	.90	
KORD-KDSM-KFFO -KORD	>0	0	6.05	.10	
KORD-KMCI-KIND -KORD	>0	0	5.72	.32	
KORD-KMCI-KLEX -KORD	>0	0	6.54	.45	
KORD-KMCI-KMSP -KORD	>0	0	5.84	1.51	
KORD-KMCI-KOFF -KORD	>0	0	5.40	2.61	Feasible/Combine
KORD-KMCI-KBLV -KORD	>0	0	5.33	1.20	
KORD-KMCI-KFFO -KORD	>0	0	6.53	.24	
KORD-KIND-KMSP -KORD	>0	0	5.50	.03	
KORD-KIND-KLEX -KORD	>0	0	4.06	1.11	
KORD-KIND-KOFF -KORD	>0	0	5.97	.22	
KORD-KIND-KBLV -KORD	>0	0	4.06	.65	
KORD-KIND-KFFO -KORD	>0	0	3.93	1.02	
KORD-KLEX-KMSP -KORD	>0	0	6.44	.04	
KORD-KLEX-KOFF -KORD	>0	0	6.84	.30	
KORD-KLEX-KBLV -KORD	>0	0	4.81	.85	
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	
KORD-KMSP-KOFF -KORD	>0	0	5.64	1.86	
KORD-KMSP-KBLV -KORD	>0	0	5.52	.50	
KORD-KMSP-KFFO -KORD	>0	0	6.26	0	
KORD-KOFF-KBLV -KORD	>0	0	5.67	1.01	
KORD-KOFF-KFFO -KORD	>0	0	6.79	.13	
KORD-KBLV-KFFO -KORD	>0	0	4.84	.60	
KORD-KDSM-KOFF -KMCI-KORD	>0	0	6.40	2.62	Feasible/Combine

KORD-KDSM-KOFF -KMCI-KIND-KORD	>0	0	8.19	.32	
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	Feasible/Combine
KORD-KDSM-KOFF -KMCI-KORD	>0	0	6.40	2.62	Feasible/Select
KORD-KLEX-KFFO -KIND-KORD	>0	0	5.27	1.10	
KORD-KLEX-KFFO -KCLE-KORD	>0	0	6.14	1.55	Feasible/Select
KORD-KIND-KMSP -KORD	>0	0	5.50	.03	
KORD-KIND-KBLV -KORD	>0	0	4.06	.65	Feasible/Combine
KORD-KMSP-KBLV -KORD	>0	0	5.52	.50	
KORD-KIND-KBLV -KMSP-KORD	>0	0	6.98	.50	Feasible/Select
KORD-KDTW-KORD	>0	0	2.83	-	Feasible/Select

Split Delivery Routing

Route	C	U	T	S	Remarks
KORD-KDSM-KOFF -KMCI-KIND-KORD + KCLE-KFFO-KLEX -KIND-KORD	0	0	15.33	-.33	No Savings

Selected Routes

KORD-KBLV-KORD
KORD-KDTW-KORD
KORD-KFFO-KORD
KORD-KDSM-KOFF-KMCI-KORD
KORD-KIND-KBLV-KMSP-KORD
KORD-KCLE-KFFO-KLEX-KORD

Total Time: 27.61
Aircraft Required: 4

Applicable Days: 13

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KORD-KDTW-KORD	>0	0	2.83	-	
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KDSM-KORD	>0	0	3.31	-	
KORD-KMCI-KORD	>0	0	3.93	-	
KORD-KIND-KORD	>0	0	2.11	-	
KORD-KLEX-KORD	>0	0	3.06	-	
KORD-KMSP-KORD	>0	0	3.42	-	
KORD-KOFF-KORD	>0	0	4.08	-	
KORD-KBLV-KORD	0	>0	2.60	-	Feasible/Select
KORD-KFFO-KORD	0	>0	2.84	-	Feasible/Select
KORD-KBLV-KORD	>0	0	2.60	-	
KORD-KFFO-KORD	>0	0	2.84	-	
KORD-KDTW-KCLE -KORD	0	>0	4.47	1.79	
KORD-KDTW-KDSM -KORD	>0	0	6.14	0	
KORD-KDTW-KMCI -KORD	0	>0	6.73	.03	
KORD-KDTW-KIND -KORD	>0	0	4.24	.70	
KORD-KDTW-KLEX -KORD	0	>0	4.82	1.07	
KORD-KDTW-KMSP -KORD	0	>0	6.17	.08	
KORD-KDTW-KOFF -KORD	0	>0	6.91	0	
KORD-KDTW-KBLV -KORD	0	>0	5.17	.26	
KORD-KDTW-KFFO -KORD	>0	0	4.39	1.28	
KORD-KCLE-KDSM -KORD	>0	0	6.74	0	
KORD-KCLE-KMCI -KORD	>0	0	7.30	.06	
KORD-KCLE-KIND -KORD	>0	0	4.72	.82	
KORD-KCLE-KLEX -KORD	>0	0	5.12	1.37	
KORD-KCLE-KMSP -KORD	>0	0	6.81	.04	
KORD-KCLE-KOFF -KORD	>0	0	7.50	.01	
KORD-KCLE-KBLV -KORD	>0	0	5.67	.36	
KORD-KCLE-KFFO					

-KORD	>0	0	4.72	1.55	
KORD-KDSM-KMCI -KORD	>0	0	5.12	2.12	
KORD-KDSM-KIND -KORD	>0	0	5.23	.19	
KORD-KDSM-KLEX -KORD	>0	0	6.13	.24	
KORD-KDSM-KMSP -KORD	>0	0	5.04	1.69	
KORD-KDSM-KOFF -KORD	>0	0	5.09	2.30	
KORD-KDSM-KBLV -KORD	>0	0	5.01	.90	
KORD-KDSM-KFFO -KORD	>0	0	6.05	.10	
KORD-KMCI-KIND -KORD	>0	0	5.72	.32	
KORD-KMCI-KLEX -KORD	>0	0	6.54	.45	
KORD-KMCI-KMSP -KORD	>0	0	5.84	1.51	
KORD-KMCI-KOFF -KORD	>0	0	5.40	2.61	Feasible/Combine
KORD-KMCI-KBLV -KORD	>0	0	5.33	1.20	
KORD-KMCI-KFFO -KORD	>0	0	6.53	.24	
KORD-KIND-KMSP -KORD	>0	0	5.50	.03	
KORD-KIND-KLEX -KORD	>0	0	4.06	1.11	
KORD-KIND-KOFF -KORD	>0	0	5.97	.22	
KORD-KIND-KBLV -KORD	>0	0	4.06	.65	
KORD-KIND-KFFO -KORD	>0	0	3.93	1.02	
KORD-KLEX-KMSP -KORD	>0	0	6.44	.04	
KORD-KLEX-KOFF -KORD	>0	0	6.84	.30	
KORD-KLEX-KBLV -KORD	>0	0	4.81	.85	
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	
KORD-KMSP-KOFF -KORD	>0	0	5.64	1.86	
KORD-KMSP-KBLV -KORD	>0	0	5.52	.50	
KORD-KMSP-KFFO					

-KORD	>0	0	6.26	0	
KORD-KOFF-KBLV -KORD	>0	0	5.67	1.01	
KORD-KOFF-KFFO -KORD	>0	0	6.79	.13	
KORD-KBLV-KFFO -KORD	>0	0	4.84	.60	
KORD-KDSM-KOFF -KMCI-KORD	>0	0	6.40	2.62	Feasible/Select
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	Feasible/Combine
KORD-KLEX-KFFO -KIND-KORD	>0	0	5.27	1.10	
KORD-KLEX-KFFO -KCLE-KORD	>0	0	6.14	1.55	Feasible/Combine
KORD-KIND-KLEX -KFFO-KCLE-KORD	>0	0	7.14	1.11	Feasible/Select
KORD-KMSP-KBLV -KORD	>0	0	5.52	.50	
KORD-KDTW-KORD	>0	0	2.83	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KORD-KFFO-KORD
KORD-KBLV-KORD
KORD-KDTW-KORD
KORD-KBLV-KMSP-KORD
KORD-KDSM-KOFF-KMCI-KORD
KORD-KCLE-KFFO-KLEX-KIND-KORD

Time Required: 27.33
Aircraft Required: 4

Applicable Days: 14, 16-17, 35-41, 67-73

Clarke-Wright Calculations

Route	C	U	T	S	Remarks

KORD-KDTW-KORD	>0	0	2.83	-	
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KDSM-KORD	>0	0	3.31	-	
KORD-KMCI-KORD	>0	0	3.93	-	
KORD-KIND-KORD	>0	0	2.11	-	
KORD-KLEX-KORD	>C	0	3.06	-	
KORD-KMSP-KORD	>0	0	3.42	-	
KORD-KOFF-KORD	>0	0	4.08	-	
KORD-KFFO-KORD	0	>0	2.84	-	Feasible/Select
KORD-KBLV-KORD	0	>0	2.60	-	Feasible/Select
KORD-KFFO-KORD	>0	0	2.84	-	
KORD-KBLV-KORD	>0	0	2.60	-	
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	
KORD-KDTW-KDSM -KORD	>0	0	6.14	0	
KORD-KDTW-KMCI -KORD	0	>0	6.73	.03	
KORD-KDTW-KIND -KORD	>0	0	4.24	.70	
KORD-KDTW-KLEX -KORD	0	>0	4.82	1.07	
KORD-KDTW-KMSP -KORD	0	>0	6.17	.08	
KORD-KDTW-KOFF -KORD	>0	0	6.91	0	
KORD-KDTW-KBLV -KORD	0	>0	5.17	.26	
KORD-KDTW-KFFO -KORD	>0	0	4.39	1.28	
KORD-KCLE-KDSM -KORD	>0	0	6.74	0	
KORD-KCLE-KMCI -KORD	>0	0	7.30	.06	
KORD-KCLE-KIND -KORD	>0	0	4.72	.82	
KORD-KCLE-KLEX -KORD	>0	0	5.12	1.37	
KORD-KCLE-KMSP -KORD	>0	0	6.81	.04	
KORD-KCLE-KOFF -KORD	>0	0	7.50	.01	
KORD-KCLE-KBLV -KORD	>0	0	5.67	.36	
KORD-KCLE-KFFO -KORD	>0	0	4.72	1.55	
KORD-KDSM-KMCI -KORD	>0	0	5.12	2.12	
KORD-KDSM-KIND -KORD	>0	0	5.23	.19	
KORD-KDSM-KLEX					

-KORD	>0	0	6.13	.24	
KORD-KDSM-KMSP					
-KORD	>0	0	5.04	1.69	
KORD-KDSM-KOFF					
-KORD	>0	0	5.09	2.30	
KORD-KDSM-KBLV					
-KORD	>0	0	5.01	.90	
KORD-KDSM-KFFO					
-KORD	>0	0	6.05	.10	
KORD-KMCI-KIND					
-KORD	>0	0	5.72	.32	
KORD-KMCI-KLEX					
-KORD	>0	0	6.54	.45	
KORD-KMCI-KMSP					
-KORD	0	>0	5.84	1.51	
KORD-KMCI-KOFF					
-KORD	>0	0	5.40	2.61	Feasible/Combine
KORD-KMCI-KBLV					
-KORD	>0	0	5.33	1.20	
KORD-KMCI-KFFO					
-KORD	>0	0	6.53	.24	
KORD-KIND-KMSP					
-KORD	>0	0	5.50	.03	
KORD-KIND-KLEX					
-KORD	>0	0	4.06	1.11	
KORD-KIND-KOFF					
-KORD	>0	0	5.97	.22	
KORD-KIND-KBLV					
-KORD	>0	0	4.06	.65	
KORD-KIND-KFFO					
-KORD	>0	0	3.93	1.02	
KORD-KLEX-KMSP					
-KORD	0	>0	6.44	.04	
KORD-KLEX-KOFF					
-KORD	>0	0	6.84	.30	
KORD-KLEX-KBLV					
-KORD	>0	0	4.81	.85	
KORD-KLEX-KFFO					
-KORD	>0	0	4.26	1 64	
KORD-KMSP-KOFF					
-KORD	>0	0	5.64	1.86	
KORD-KMSP-KBLV					
-KORD	0	>0	5.52	.50	
KORD-KMSP-KFFO					
-KORD	>0	0	6.26	0	
KORD-KOFF-KBLV					
-KORD	>0	0	5.67	1.01	
KORD-KOFF-KFFO					
-KORD	>0	0	6.79	.13	
KORD-KBLV-KFFO					

-KORD	>0	0	4.84	.60	
KORD-KDSM-KOFF -KMCI-KORD	>0	0	6.40	2.62	Feasible/Combine
KORD-KDSM-KOFF -KMCI-KIND-KORD	0	0	8.19	.32	
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	Feasible/Combine
KORD-KDSM-KOFF -KMCI-KORD	>0	0	6.40	2.62	Feasible/Select
KORD-KDTW-KCLE -KFFO-KORD	>0	0	5.75	1.56	
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	Feasible/Combine
KORD-KIND-KLEX -KFFO-KORD	>0	0	5.27	1.10	
KORD-KDTW-KCLE -KFFO-KORD	>0	0	5.75	1.56	Feasible/Select
KORD-KIND-KLEX -KORD	>0	0	4.06	1.11	Feasible/Combine
KORD-KIND-KLEX -KBLV-KORD	0	0	5.83	.83	Feasible/Select
KORD-KMSP-KORD	>0	0	3.42	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KORD-KFFO-KORD
KORD-KBLV-KORD
KORD-KMSP-KORD
KORD-KDSM-KOFF-KMCI-KORD
KORD-KDTW-KCLE-KFFO-KORD
KORD-KIND-KLEX-KBLV-KORD

Total Time: 26.84
Aircraft Required: 4

Applicable Days: 15

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KORD-KDTW-KORD	>0	0	2.83	-	
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KDSM-KORD	>0	0	3.31	-	
KORD-KMCI-KORD	>0	0	3.93	-	
KORD-KIND-KORD	>0	0	2.11	-	
KORD-KLEX-KORD	>0	0	3.06	-	
KORD-KMSP-KORD	>0	0	3.42	-	
KORD-KOFF-KORD	>0	0	4.08	-	
KORD-KBLV-KORD	0	>0	2.60	-	Feasible/Select
KORD-KFFO-KORD	0	>0	2.84	-	Feasible/Select
KORD-KBLV-KORD	>0	0	2.60	-	
KORD-KFFO-KORD	>0	0	2.84	-	
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	
KORD-KDTW-KDSM -KORD	>0	0	6.14	0	
KORD-KDTW-KMCI -KORD	0	>0	6.73	.03	
KORD-KDTW-KIND -KORD	>0	0	4.24	.70	
KORD-KDTW-KLEX -KORD	0	>0	4.82	1.07	
KORD-KDTW-KMSP -KORD	0	0	6.17	.08	
KORD-KDTW-KOFF -KORD	>0	0	6.91	0	
KORD-KDTW-KBLV -KORD	0	>0	5.17	.26	
KORD-KDTW-KFFO -KORD	>0	0	4.39	1.28	
KORD-KCLE-KDSM -KORD	>0	0	6.74	0	
KORD-KCLE-KMCI -KORD	>0	0	7.30	.06	
KORD-KCLE-KIND -KORD	>0	0	4.72	.82	
KORD-KCLE-KLEX -KORD	>0	0	5.12	1.37	
KORD-KCLE-KMSP -KORD	>0	0	6.81	.04	
KORD-KCLE-KOFF -KORD	>0	0	7.50	.01	
KORD-KCLE-KBLV -KORD	>0	0	5.67	.36	
KORD-KCLE-KFFO -KORD	>0	0	4.72	1.55	

KORD-KDSM-KMCI -KORD	>0	0	5.12	2.12	
KORD-KDSM-KIND -KORD	>0	0	5.23	.19	
KORD-KDSM-KLEX -KORD	>0	0	6.13	.24	
KORD-KDSM-KMSP -KORD	>0	0	5.04	1.69	
KORD-KDSM-KOFF -KORD	>0	0	5.09	2.30	
KORD-KDSM-KBLV -KORD	>0	0	5.01	.90	
KORD-KDSM-KFFO -KORD	>0	0	6.05	.10	
KORD-KMCI-KIND -KORD	>0	0	5.72	.32	
KORD-KMCI-KLEX -KORD	0	0	6.54	.45	
KORD-KMCI-KMSP -KORD	>0	0	5.84	1.51	
KORD-KMCI-KOFF -KORD	>0	0	5.40	2.61	Feasible/Combine
KORD-KMCI-KBLV -KORD	>0	0	5.33	1.20	
KORD-KMCI-KFFO -KORD	>0	0	6.53	.24	
KORD-KIND-KMSP -KORD	>0	0	5.50	.03	
KORD-KIND-KLEX -KORD	>0	0	4.06	1.11	
KORD-KIND-KOFF -KORD	>0	0	5.97	.22	
KORD-KIND-KBLV -KORD	>0	0	4.06	.65	
KORD-KIND-KFFO -KORD	>0	0	3.93	1.02	
KORD-KLEX-KMSP -KORD	>0	0	6.44	.04	
KORD-KLEX-KOFF -KORD	>0	0	6.84	.30	
KORD-KLEX-KBLV -KORD	>0	0	4.81	.85	
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	
KORD-KMSP-KOFF -KORD	>0	0	5.64	1.86	
KORD-KMSP-KBLV -KORD	>0	0	5.52	.50	
KORD-KMSP-KFFO -KORD	>0	0	6.26	0	
KORD-KOFF-KBLV					

-KORD	>0	0	5.67	1.01	
KORD-KOFF-KFFO -KORD	>0	0	6.79	.13	
KORD-KBLV-KFFO -KORD	>0	0	4.84	.60	
KORD-KDSM-KOFF -KMCI-KORD	>0	0	6.40	2.62	Feasible/Combine
KORD-KDSM-KOFF -KMCI-KIND-KORD	0	0	8.19	.32	
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	Feasible/Combine
KORD-KDSM-KOFF -KMCI-KORD	>0	0	6.40	2.62	Feasible/Select
KORD-KDTW-KCLE -KFFO-KORD	>0	0	5.75	1.56	
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	Feasible/Combine
KORD-KIND-KLEX -KFFO-KORD	>0	0	5.27	1.10	
KORD-KDTW-KCLE -KFFO-KORD	>0	0	5.75	1.56	Feasible/Select
KORD-KIND-KLEX -KORD	>0	0	4.06	1.11	Feasible/Select
KORD-KBLV-KMSP -KORD	>0	0	5.52	.50	Feasible/Select

<u>Split Delivery Calculations</u>

Route	C	U	T	S	Remarks
KORD-KDSM-KOFF -KMCI-KBLV-KORD + KORD-KIND-KLEX -KBLV-KORD	0	0	13.63	-1.07	No Savings

<u>Selected Routes</u>

KORD-KFFO-KORD
KORD-KBLV-KORD
KORD-KIND-KLEX-KORD
KORD-KBLV-KMSP-KORD
KORD-KDTW-KCLE-KFFO-KORD
KORD-KDSM-KOFF-KMCI-KORD

Total Time: 27.17
Aircraft Required: 4

Applicable Days: 18, 74

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KORD-KDTW-KORD	>0	0	2.83	-	
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KMCI-KORD	>0	0	3.93	-	
KORD-KLEX-KORD	>0	0	3.06	-	
KORD-KMSP-KORD	>0	0	3.42	-	
KORD-KOFF-KORD	>0	0	4.08	-	
KORD-KBLV-KORD	>0	0	2.60	-	
KORD-KFFO-KORD	>0	0	2.84	-	
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	
KORD-KDTW-KMCI -KORD	>0	0	6.73	.03	
KORD-KDTW-KLEX -KORD	>0	0	4.82	1.07	
KORD-KDTW-KMSP -KORD	>0	0	6.17	.08	
KORD-KDTW-KOFF -KORD	>0	0	6.91	0	
KORD-KDTW-KBLV -KORD	0	>0	5.17	.26	
KORD-KDTW-KFFO -KORD	0	>0	4.39	1.28	
KORD-KCLE-KMCI -KORD	>0	0	7.30	.06	
KORD-KCLE-KLEX -KORD	>0	0	5.12	1.37	
KORD-KCLE-KMSP -KORD	>0	0	6.81	.04	
KORD-KCLE-KOFF -KORD	>0	0	7.50	.01	
KORD-KCLE-KBLV -KORD	0	>0	5.67	.36	
KORD-KCLE-KFFO -KORD	0	>0	4.72	1.55	
KORD-KMCI-KLEX -KORD	0	0	6.54	.45	
KORD-KMCI-KMSP -KORD	>0	0	5.84	1.51	
KORD-KMCI-KOFF					

-KORD	>0	0	5.40	2.61	Feasible/Combine
KORD-KMCI-KBLV -KORD	0	>0	5.33	1.20	
KORD-KMCI-KFFO -KORD	>0	0	6.53	.24	
KORD-KLEX-KMSP -KORD	>0	0	6.44	.04	
KORD-KLEX-KOFF -KORD	>0	0	6.84	.30	
KORD-KLEX-KBLV -KORD	0	>0	4.81	.85	
KORD-KLEX-KFFO -KORD	0	>0	4.26	1.64	
KORD-KMSP-KOFF -KORD	>0	0	5.64	1.86	
KORD-KMSP-KBLV -KORD	0	>0	5.52	.50	
KORD-KMSP-KFFO -KORD	0	>0	6.26	0	
KORD-KOFF-KBLV -KORD	0	>0	5.67	1.01	
KORD-KOFF-KFFO -KORD	>0	0	6.79	.13	
KORD-KBLV-KFFO -KORD	0	>0	4.84	.60	
KORD-KMCI-KOFF -KMSP-KORD	>0	0	6.96	1.86	Feasible/Combine
KORD-KMCI-KOFF -KMSP-KCLE-KORD	>0	0	10.34		Unfeasible/Time
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	Feasible/Select
KORD-KMCI-KOFF -KMSP-KORD	>0	0	6.96	1.86	Feasible/Select
KORD-KFFO-KORD	>0	0	2.84	-	Feasible/Select
KORD-KBLV-KORD	>0	0	2.60	-	Feasible/Select
KORD-KLEX-KORD	>0	0	3.06	-	Feasible/Select

<u>Split Delivery Calculations</u>

Route	C	U	T	S	Remarks
KORD-KDTW-KCLE -KFFO-KORD + KORD-KLEX-KFFO -KORD	0	0	10.01	.36	Feasible/Select

Selected Routes

KORD-KBLV-KORD
KORD-KLEX-KFFO-KORD
KORD-KDTW-KCLE-KFFO-KORD
KORD-KMCI-KOFF-KMSP-KORD

Total Time: 19.57
Aircraft Required: 3

Applicable Days: 19-28, 79-83

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KORD-KFFO-KORD	>0	0	2.84	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KORD-KFFO-KORD

Total Time: 2.84
Aircraft Required: 1

Applicable Days: 29-34, 42, 57-66, 89-90

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KORD-KDTW-KORD	>0	0	2.83	-	
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KDSM-KORD	>0	0	3.31	-	
KORD-KMCI-KORD	>0	0	3.93	-	
KORD-KIND-KORD	>0	0	2.11	-	
KORD-KLEX-KORD	>0	0	3.06	-	
KORD-KMSP-KORD	>0	0	3.42	-	
KORD-KOFF-KORD	>0	0	4.08	-	
KORD-KBLV-KORD	0	>0	2.60	-	Feasible/Select
KORD-KFFO-KORD	0	>0	2.84	-	Feasible/Select
KORD-KBLV-KORD	>0	0	2.60	-	
KORD-KFFO-KORD	>0	0	2.84	-	

KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79
KORD-KDTW-KDSM -KORD	>0	0	6.14	0
KORD-KDTW-KMCI -KORD	0	>0	6.73	.03
KORD-KDTW-KIND -KORD	>0	0	4.24	.70
KORD-KDTW-KLEX -KORD	0	>0	4.82	1.07
KORD-KDTW-KMSP -KORD	0	0	6.17	.08
KORD-KDTW-KOFF -KORD	>0	0	6.91	0
KORD-KDTW-KBLV -KORD	0	>0	5.17	.26
KORD-KDTW-KFFO -KORD	>0	0	4.39	1.28
KORD-KCLE-KDSM -KORD	>0	0	6.74	0
KORD-KCLE-KMCI -KORD	>0	0	7.30	.06
KORD-KCLE-KIND -KORD	>0	0	4.72	.82
KORD-KCLE-KLEX -KORD	>0	0	5.12	1.37
KORD-KCLE-KMSP -KORD	>0	0	6.81	.04
KORD-KCLE-KOFF -KORD	>0	0	7.50	.01
KORD-KCLE-KBLV -KORD	>0	0	5.67	.36
KORD-KCLE-KFFO -KORD	>0	0	4.72	1.55
KORD-KDSM-KMCI -KORD	>0	0	5.12	2.12
KORD-KDSM-KIND -KORD	>0	0	5.23	.19
KORD-KDSM-KLEX -KORD	>0	0	6.13	.24
KORD-KDSM-KMSP -KORD	>0	0	5.04	1.69
KORD-KDSM-KOFF -KORD	>0	0	5.09	2.30
KORD-KDSM-KBLV -KORD	>0	0	5.01	.90
KORD-KDSM-KFFO -KORD	>0	0	6.05	.10
KORD-KMCI-KIND				

-KORD	>0	0	5.72	.32	
KORD-KMCI-KLEX -KORD	0	0	6.54	.45	
KORD-KMCI-KMSP -KORD	>0	0	5.84	1.51	
KORD-KMCI-KOFF -KORD	>0	0	5.40	2.61	Feasible/Combine
KORD-KMCI-KBLV -KORD	>0	0	5.33	1.20	
KORD-KMCI-KFFO -KORD	>0	0	6.53	.24	
KORD-KIND-KMSP -KORD	>0	0	5.50	.03	
KORD-KIND-KLEX -KORD	>0	0	4.06	1.11	
KORD-KIND-KOFF -KORD	>0	0	5.97	.22	
KORD-KIND-KBLV -KORD	>0	0	4.06	.65	
KORD-KIND-KFFO -KORD	>0	0	3.93	1.02	
KORD-KLEX-KMSP -KORD	>0	0	6.44	.04	
KORD-KLEX-KOFF -KORD	>0	0	6.84	.30	
KORD-KLEX-KBLV -KORD	>0	0	4.81	.85	
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	
KORD-KMSP-KOFF -KORD	>0	0	5.64	1.86	
KORD-KMSP-KBLV -KORD	>0	0	5.52	.50	
KORD-KMSP-KFFO -KORD	>0	0	6.26	0	
KORD-KOFF-KBLV -KORD	>0	0	5.67	1.01	
KORD-KOFF-KFFO -KORD	>0	0	6.79	.13	
KORD-KBLV-KFFO -KORD	>0	0	4.84	.60	
KORD-KDSM-KOFF -KMCI-KORD	>0	0	6.40	2.62	Feasible/Combine
KORD-KDSM-KOFF -KMCI-KIND-KORD	0	0	8.19	.32	
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	Feasible/Combine

KORD-KDTW-KCLE -KFFO-KORD	0	>0	5.75	1.56	Unfeasible/Cap
KORD-KDSM-KOFF -KMCI-KORD	>0	0	6.40	2.62	Feasible/Select
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	Feasible/Select
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	Feasible/Combine
KORD-KIND-KLEX -KFFO-KORD	>0	0	5.27	1.10	Feasible/Select
KORD-KBLV-KMSP -KORD	>0	0	5.52	.50	Feasible/Select

<u>Split Delivery Calculations</u>

Route	C	U	T	S	Remarks
KORD-KDSM-KOFF -KMCI-KBLV-KORD + KORD-KFFO-KLEX -KIND-KBLV-KORD	0	0	15.02	-1.25	No Savings

<u>Selected Routes</u>

KORD-KFFO-KORD
KORD-KBLV-KORD
KORD-KDTW-KCLE-KORD
KORD-KBLV-KMSP-KORD
KORD-KFFO-KLEX-KIND-KORD
KORD-KDSM-KOFF-KMCI-KORD

Total Time: 27.10
Aircraft Required: 4

Applicable Days: 46

<u>Clarke-Wright Calculations</u>

Route	C	U	T	S	Remarks
KORD-KDTW-KORD	>0	0	2.83	-	
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KMCI-KORD	>0	0	3.93	-	
KORD-KLEX-KORD	>0	0	3.06	-	
KORD-KMSP-KORD	>0	0	3.42	-	

KORD-KOFF-KORD	>0	0	4.08	-	
KORD-KBLV-KORD	>0	0	2.60	-	
KORD-KFFO-KORD	0	>0	2.84	-	Feasible/Select
KORD-KFFO-KORD	>0	0	2.84	-	
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	
KORD-KDTW-KMCI -KORD	>0	0	6.73	.03	
KORD-KDTW-KLEX -KORD	>0	0	4.82	1.07	
KORD-KDTW-KMSP -KORD	>0	0	6.17	.08	
KORD-KDTW-KOFF -KORD	>0	0	6.91	0	
KORD-KDTW-KBLV -KORD	0	>0	5.17	.26	
KORD-KDTW-KFFO -KORD	>0	0	4.39	1.28	
KORD-KCLE-KMCI -KORD	>0	0	7.30	.06	
KORD-KCLE-KLEX -KORD	>0	0	5.12	1.37	
KORD-KCLE-KMSP -KORD	>0	0	6.81	.04	
KORD-KCLE-KOFF -KORD	>0	0	7.50	.01	
KORD-KCLE-KBLV -KORD	0	>0	5.67	.36	
KORD-KCLE-KFFO -KORD	>0	0	4.72	1.55	
KORD-KMCI-KLEX -KORD	>0	0	6.54	.45	
KORD-KMCI-KMSP -KORD	>0	0	5.84	1.51	
KORD-KMCI-KOFF -KORD	>0	0	5.40	2.61	Feasible/Combine
KORD-KMCI-KBLV -KORD	0	>0	5.33	1.20	
KORD-KMCI-KFFO -KORD	>0	0	6.53	.24	
KORD-KLEX-KMSP -KORD	>0	0	6.44	.04	
KORD-KLEX-KOFF -KORD	>0	0	6.84	.30	
KORD-KLEX-KBLV -KORD	0	>0	4.8[illegible]	.85	
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	
KORD-KMSP-KOFF					

-KORD	>0	0	5.64	1.86	
KORD-KMSP-KBLV -KORD	0	>0	5.52	.50	
KORD-KMSP-KFFO -KORD	>0	0	6.26	0	
KORD-KOFF-KBLV -KORD	0	>0	5.67	1.01	
KORD-KOFF-KFFO -KORD	>0	0	6.79	.13	
KORD-KBLV-KFFO -KORD	>0	0	4.84	.60	
KORD-KMCI-KOFF -KMSP-KORD	>0	0	6.96	1.86	Feasible/Combine
KORD-KMCI-KOFF -KMSP-KCLE-KORD	>0	0	10.34		Unfeasible/Time
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	Feasible/Combine
KORD-KMCI-KOFF -KMSP-KORD	>0	0	6.96	1.86	Feasible/Select
KORD-KDTW-KCLE -KFFO-KORD	>0	0	5.75	1.56	
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	Feasible/Select
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	Feasible/Select
KORD-KBLV-KORD	>0	0	2.60	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KORD-KFFO-KORD
KORD-KBLV-KORD
KORD-KDTW-KCLE-KORD
KORD-KLEX-KFFO-KORD
KORD-KMSP-KOFF-KMCI-KORD

Total Time: 21.13
Aircraft Required: 3

Applicable Days: 47, 84

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KFFO-KORD	>0	0	2.84	-	
KORD-KCLE-KFFO -KORD	>0	0	4.72	1.55	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KORD-KCLE-KFFO-KORD

Total Time: 4.72
Aircraft Required: 1

Applicable Days: 48

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KORD-KCLE-KORD	>0	0	3.43	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KORD-KCLE-KORD

Total Time: 3.43
Aircraft Required: 1

Applicable Days: 49

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KDTW-KORD	>0	0	2.83	-	

KORD-KCLE-KDTW

-KORD	>0	0	4.47	1.79	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KORD-KCLE-KDTW-KORD

Total Time: 4.47
Aircraft Required: 1
Applicable Days: 50

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KORD-KDTW-KORD	>0	0	2.83	-	
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KDSM-KORD	>0	0	3.31	-	
KORD-KMCI-KORD	>0	0	3.93	-	
KORD-KIND-KORD	>0	0	2.11	-	
KORD-KLEX-KORD	>0	0	3.06	-	
KORD-KMSP-KORD	>0	0	3.42	-	
KORD-KOFF-KORD	>0	0	4.08	-	
KORD-KBLV-KORD	>0	0	2.60	-	
KORD-KFFO-KORD	>0	0	2.84	-	
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	
KORD-KDTW-KDSM -KORD	>0	0	6.14	0	
KORD-KDTW-KMCI -KORD	>0	0	6.73	.03	
KORD-KDTW-KIND -KORD	>0	0	4.24	.70	
KORD-KDTW-KLEX -KORD	0	>0	4.82	1.07	
KORD-KDTW-KMSP -KORD	>0	0	6.17	.08	
KORD-KDTW-KOFF -KORD	0	>0	6.91	0	
KORD-KDTW-KBLV -KORD	0	>0	5.17	.26	
KORD-KDTW-KFFO -KORD	0	>0	4.39	1.28	
KORD-KCLE-KDSM -KORD	>0	0	6.74	0	
KORD-KCLE-KMCI -KORD	>0	0	7.30	.06	

KORD-KCLE-KIND -KORD	>0	0	4.72	.82	
KORD-KCLE-KLEX -KORD	>0	0	5.12	1.37	
KORD-KCLE-KMSP -KORD	>0	0	6.81	.04	
KORD-KCLE-KOFF -KORD	0	>0	7.50	.01	
KORD-KCLE-KBLV -KORD	0	>0	5.67	.36	
KORD-KCLE-KFFO -KORD	0	>0	4.72	1.55	
KORD-KDSM-KMCI -KORD	>0	0	5.12	2.12	
KORD-KDSM-KIND -KORD	>0	0	5.23	.19	
KORD-KDSM-KLEX -KORD	>0	0	6.13	.24	
KORD-KDSM-KMSP -KORD	>0	0	5.04	1.69	
KORD-KDSM-KOFF -KORD	>0	0	5.09	2.30	
KORD-KDSM-KBLV -KORD	>0	0	5.01	.90	
KORD-KDSM-KFFO -KORD	0	>0	6.05	.10	
KORD-KMCI-KIND -KORD	>0	0	5.72	.32	
KORD-KMCI-KLEX -KORD	>0	0	6.54	.45	
KORD-KMCI-KMSP -KORD	0	>0	5.84	1.51	
KORD-KMCI-KOFF -KORD	0	0	5.40	2.61	Feasible/Select
KORD-KMCI-KBLV -KORD	0	>0	5.33	1.20	
KORD-KMCI-KFFO -KORD	0	>0	6.53	.24	
KORD-KIND-KMSP -KORD	>0	0	5.50	.03	
KORD-KIND-KLEX -KORD	>0	0	4.06	1.11	
KORD-KIND-KOFF -KORD	>0	0	5.97	.22	
KORD-KIND-KBLV -KORD	>0	0	4.06	.65	
KORD-KIND-KFFO -KORD	0	>0	3.93	1.02	
KORD-KLEX-KMSP -KORD	>0	0	6.44	.04	
KORD-KLEX-KOFF					

-KORD	0	>0	6.84	.30	
KORD-KLEX-KBLV -KORD	0	>0	4.81	.85	
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	
KORD-KMSP-KOFF -KORD	>0	0	5.64	1.86	
KORD-KMSP-KBLV -KORD	0	>0	5.52	.50	
KORD-KMSP-KFFO -KORD	0	>0	6.26	0	
KORD-KOFF-KBLV -KORD	0	>0	5.67	1.01	
KORD-KOFF-KFFO -KORD	0	>0	6.79	.13	
KORD-KBLV-KFFO -KORD	0	>0	4.84	.60	
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	Feasible/Combine
KORD-KDTW-KCLE -KIND-KORD	>0	0	5.76	.82	
KORD-KDSM-KDTW -KCLE-KORD	>0	0	7.78	0	
KORD-KDSM-KMSP -KORD	>0	0	5.04	1.69	Feasible/Combine
KORD-KMSP-KDSM -KIND-KORD	>0	0	6.96	.19	
KORD-KIND-KLEX -KORD	>0	0	4.06	1.11	Feasible/Combine
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	Feasible/Select
KORD-KMSP-KDSM -KLEX-KIND-KORD	>0	0	8.86	.24	Feasible/Select
KORD-KFFO-KBLV -KORD	0	>0	4.84	.60	Unfeasible/Cap
KORD-KFFO-KORD	>0	0	2.84	-	Feasible/Select
KORD-KBLV-KORD	>0	0	2.60	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KORD-KFFO-KORD
KORD-KBLV-KORD
KORD-KOFF-KMCI-KORD
KORD-KDTW-KCLE-KORD
KORD-KIND-KLEX-KDSM-KMSP-KORD

Total Time: 24.17
Aircraft Required: 3

Applicable Days: 51

Clarke-Wright Calculations

Route	C	U	T	S	Remarks
KORD-KDTW-KORD	>0	0	2.83	-	
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KDSM-KORD	>0	0	3.31	-	
KORD-KMCI-KORD	>0	0	3.93	-	
KORD-KIND-KORD	>0	0	2.11	-	
KORD-KLEX-KORD	>0	0	3.06	-	
KORD-KMSP-KORD	>0	0	3.42	-	
KORD-KOFF-KORD	>0	0	4.08	-	
KORD-KFFO-KORD	0	>0	2.84	-	Feasible/Select
KORD-KBLV-KORD	>0	0	2.60	-	
KORD-KFFO-KORD	>0	0	2.84	-	
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	
KORD-KDTW-KDSM -KORD	>0	0	6.14	0	
KORD-KDTW-KMCI -KORD	>0	0	6.73	.03	
KORD-KDTW-KIND -KORD	>0	0	4.24	.70	
KORD-KDTW-KLEX -KORD	0	>0	4.82	1.07	
KORD-KDTW-KMSP -KORD	>0	0	6.17	.08	
KORD-KDTW-KOFF -KORD	0	>0	6.91	0	
KORD-KDTW-KBLV -KORD	0	>0	5.17	.26	
KORD-KDTW-KFFO -KORD	>0	0	4.39	1.28	
KORD-KCLE-KDSM -KORD	>0	0	6.74	0	

KORD-KCLE-KMCI -KORD	>0	0	7.30	.06	
KORD-KCLE-KIND -KORD	>0	0	4.72	.82	
KORD-KCLE-KLEX -KORD	>0	0	5.12	1.37	
KORD-KCLE-KMSP -KORD	>0	0	6.81	.04	
KORD-KCLE-KOFF -KORD	>0	0	7.50	.01	
KORD-KCLE-KBLV -KORD	0	>0	5.67	.36	
KORD-KCLE-KFFO -KORD	>0	0	4.72	1.55	
KORD-KDSM-KMCI -KORD	>0	0	5.12	2.12	
KORD-KDSM-KIND -KORD	>0	0	5.23	.19	
KORD-KDSM-KLEX -KORD	>0	0	6.13	.24	
KORD-KDSM-KMSP -KORD	>0	0	5.04	1.69	
KORD-KDSM-KOFF -KORD	>0	0	5.09	2.30	
KORD-KDSM-KBLV -KORD	>0	0	5.01	.90	
KORD-KDSM-KFFO -KORD	>0	0	6.05	.10	
KORD-KMCI-KIND -KORD	>0	0	5.72	.32	
KORD-KMCI-KLEX -KORD	>0	0	6.54	.45	
KORD-KMCI-KMSP -KORD	0	>0	5.84	1.51	
KORD-KMCI-KOFF -KORD	>0	0	5.40	2.61	Feasible/Combine
KORD-KMCI-KBLV -KORD	0	>0	5.33	1.20	
KORD-KMCI-KFFO -KORD	>0	0	6.53	.24	
KORD-KIND-KMSP -KORD	>0	0	5.50	.03	
KORD-KIND-KLEX -KORD	>0	0	4.06	1.11	
KORD-KIND-KOFF -KORD	>0	0	5.97	.22	
KORD-KIND-KBLV -KORD	>0	0	4.06	.65	
KORD-KIND-KFFO -KORD	>0	0	3.93	1.02	
KORD-KLEX-KMSP					

-KORD	0	>0	6.44	.04	
KORD-KLEX-KOFF -KORD	0	>0	6.84	.30	
KORD-KLEX-KBLV -KORD	0	>0	4.81	.85	
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	
KORD-KMSP-KOFF -KORD	0	>0	5.64	1.86	
KORD-KMSP-KBLV -KORD	0	>0	5.52	.50	
KORD-KMSP-KFFO -KORD	>0	0	6.26	0	
KORD-KOFF-KBLV -KORD	0	>0	5.67	1.01	
KORD-KOFF-KFFO -KORD	>0	0	6.79	.13	
KORD-KBLV-KFFO -KORD	>0	0	4.84	.60	
KORD-KDSM-KOFF -KMCI-KORD	0	>0	6.40	2.62	Unfeasible/Cap
KORD-KMCI-KOFF -KORD	>0	0	5.40	2.61	Feasible/Select
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	Feasible/Combine
KORD-KDTW-KCLE -KFFO-KORD	>0	0	5.75	1.56	
KORD-KDSM-KMSP -KORD	>0	0	5.04	1.69	Feasible/Combine
KORD-KDSM-KMSP -KIND-KORD	>0	0	6.96	.19	
KORD-KDTW-KCLE -KFFO-KORD	>0	0	5.75	1.56	
KORD-KLEX-KFFO -KCRD	>0	0	4.26	1.64	Feasible/Combine
KORD-KIND-KLEX -KFFO-KORD	>0	0	5.27	1.10	
KORD-KDSM-KMSP -KIND-KORD	>0	0	6.96	.19	
KORD-KDTW-KCLE -KFFO-KORD	>0	0	5.75	1.56	Feasible/Combine
KORD-KDSM-KMSP -KORD	>0	0	5.04	1.69	Feasible/Select

KORD-KDTW-KCLE -KFFO-KIND-KORD	>0	0	6.84	1.02	Feasible/Select
KORD-KBLV-KLEX -KORD	0	>0	4.81	.85	Unfeasible/Cap
KORD-KBLV-KORD	>0	0	2.60	-	Feasible/Select
KORD-KLEX-KORD	>0	0	3.06	-	Feasible/Select

<u>Split Delivery Calculations</u>

Route	C	U	T	S	Remarks
KORD-KMSP-KDSM -KMCI-KORD + KORD-KBLV-KMCI -KORD	0	0	12.18	-3.22	No Savings

<u>Selected Routes</u>

KORD-KFFO-KORD
KORD-KBLV-KORD
KORD-KLEX-KORD
KORD-KDSM-KMSP-KORD
KORD-KOFF-KMCI-KORD
KORD-KDTW-KCLE-KFFO-KIND-KORD

Total Time: 25.78
Aircraft Required: 4

Applicable Days: 52-55

<u>Clarke-Wright Calculations</u>

Route	C	U	T	S	Remarks
KORD-KDTW-KORD	>0	0	2.83	-	
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KDSM-KORD	>0	0	3.31	-	
KORD-KMCI-KORD	>0	0	3.93	-	
KORD-KIND-KORD	>0	0	2.11	-	
KORD-KLEX-KORD	>0	0	3.06	-	
KORD-KMSP-KORD	>0	0	3.42	-	
KORD-KOFF-KORD	>0	0	4.08	-	
KORD-KFFO-KORD	0	>0	2.84	-	Feasible/Select
KORD-KBLV-KORD	>0	0	2.60	-	

KORD-KFFO-KORD	>0	0	2.84	-
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79
KORD-KDTW-KDSM -KORD	>0	0	6.14	0
KORD-KDTW-KMCI -KORD	>0	0	6.73	.03
KORD-KDTW-KIND -KORD	>0	0	4.24	.70
KORD-KDTW-KLEX -KORD	0	>0	4.82	1.07
KORD-KDTW-KMSP -KORD	>0	0	6.17	.08
KORD-KDTW-KOFF -KORD	>0	0	6.91	0
KORD-KDTW-KBLV -KORD	0	>0	5.17	.26
KORD-KDTW-KFFO -KORD	>0	0	4.39	1.28
KORD-KCLE-KDSM -KORD	>0	0	6.74	0
KORD-KCLE-KMCI -KORD	>0	0	7.30	.06
KORD-KCLE-KIND -KORD	>0	0	4.72	.82
KORD-KCLE-KLEX -KORD	>0	0	5.12	1.37
KORD-KCLE-KMSP -KORD	>0	0	6.81	.04
KORD-KCLE-KOFF -KORD	>0	0	7.50	.01
KORD-KCLE-KBLV -KORD	0	>0	5.67	.36
KORD-KCLE-KFFO -KORD	>0	0	4.72	1.55
KORD-KDSM-KMCI -KORD	>0	0	5.12	2.12
KORD-KDSM-KIND -KORD	>0	0	5.23	.19
KORD-KDSM-KLEX -KORD	>0	0	6.13	.24
KORD-KDSM-KMSP -KORD	>0	0	5.04	1.69
KORD-KDSM-KOFF -KORD	>0	0	5.09	2.30
KORD-KDSM-KBLV -KORD	>0	0	5.01	.90
KORD-KDSM-KFFO -KORD	>0	0	6.05	.10
KORD-KMCI-KIND				

-KORD	>0	0	5.72	.32	
KORD-KMCI-KLEX -KORD	>0	0	6.54	.45	
KORD-KMCI-KMSP -KORD	>0	0	5.84	1.51	
KORD-KMCI-KOFF -KORD	>0	0	5.40	2.61	Feasible/Combine
KORD-KMCI-KBLV -KORD	0	>0	5.33	1.20	
KORD-KMCI-KFFO -KORD	>0	0	6.53	.24	
KORD-KIND-KMSP -KORD	>0	0	5.50	.03	
KORD-KIND-KLEX -KORD	>0	0	4.06	1.11	
KORD-KIND-KOFF -KORD	>0	0	5.97	.22	
KORD-KIND-KBLV -KORD	0	>0	4.06	.65	
KORD-KIND-KFFO -KORD	>0	0	3.93	1.02	
KORD-KLEX-KMSP -KORD	>0	0	6.44	.04	
KORD-KLEX-KOFF -KORD	0	>0	6.84	.30	
KORD-KLEX-KBLV -KORD	0	>0	4.81	.85	
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	
KORD-KMSP-KOFF -KORD	>0	0	5.64	1.86	
KORD-KMSP-KBLV -KORD	0	>0	5.52	.50	
KORD-KMSP-KFFO -KORD	>0	0	6.26	0	
KORD-KOFF-KBLV -KORD	0	>0	5.67	1.01	
KORD-KOFF-KFFO -KORD	>0	0	6.79	.13	
KORD-KBLV-KFFO -KORD	>0	0	4.84	.60	
KORD-KDSM-KOFF -KMCI-KORD	>0	0	6.40	2.62	Feasible/Select
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	Feasible/Combine
KORD-KDTW-KCLE -KFFO-KORD	>0	0	5.75	1.56	

KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	Feasible/Combine
KORD-KIND-KLEX -KFFO-KORD	>0	0	5.27	1.10	
KORD-KDTW-KCLE -KFFO-KORD	>0	0	5.75	1.56	Feasible/Combine
KORD-KDTW-KCLE -KFFO-KIND-KORD	>0	0	6.84	1.02	Feasible/Select
KORD-KLEX-KMSP -KORD	>0	0	6.44	.04	Feasible/Select
KORD-KBLV-KORD	>0	0	2.60	-	Feasible/Select

<u>Split Delivery Calculations</u>

** No Splits Possible **

<u>Selected Routes</u>

KORD-KFFO-KORD
KORD-KBLV-KORD
KORD-KLEX-KMSP-KORD
KORD-KMCI-KOFF-KDSM-KORD
KORD-KDTW-KCLE-KFFO-KIND-KORD

Total Time: 25.12
Aircraft Required: 4

Applicable Days: 56

<u>Clarke-Wright Calculations</u>

Route	C	U	T	S	Remarks
KORD-KDTW-KORD	>0	0	2.83	-	
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KMCI-KORD	>0	0	3.93	-	
KORD-KLEX-KORD	>0	0	3.06	-	
KORD-KMSP-KORD	>0	0	3.42	-	
KORD-KOFF-KORD	>0	0	4.08	-	
KORD-KBLV-KORD	>0	0	2.60	-	
KORD-KFFO-KORD	>0	0	2.84	-	
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	
KORD-KDTW-KMCI					

-KORD	>0	0	6.73	.03	
KORD-KDTW-KLEX -KORD	>0	0	4.82	1.07	
KORD-KDTW-KMSP -KORD	>0	0	6.17	.08	
KORD-KDTW-KOFF -KORD	>0	0	6.91	0	
KORD-KDTW-KBLV -KORD	>0	0	5.17	.26	
KORD-KDTW-KFFO -KORD	0	>0	4.39	1.28	
KORD-KCLE-KMCI -KORD	>0	0	7.30	.06	
KORD-KCLE-KLEX -KORD	>0	0	5.12	1.37	
KORD-KCLE-KMSP -KORD	>0	0	6.81	.04	
KORD-KCLE-KOFF -KORD	>0	0	7.50	.01	
KORD-KCLE-KBLV -KORD	>0	0	5.67	.36	
KORD-KCLE-KFFO -KORD	0	>0	4.72	1.55	
KORD-KMCI-KLEX -KORD	>0	0	6.54	.45	
KORD-KMCI-KMSP -KORD	>0	0	5.84	1.51	
KORD-KMCI-KOFF -KORD	>0	0	5.40	2.61	Feasible/Combine
KORD-KMCI-KBLV -KORD	>0	0	5.33	1.20	
KORD-KMCI-KFFO -KORD	0	>0	6.53	.24	
KORD-KLEX-KMSP -KORD	>0	0	6.44	.04	
KORD-KLEX-KOFF -KORD	>0	0	6.84	.30	
KORD-KLEX-KBLV -KORD	0	0	4.81	.85	
KORD-KLEX-KFFO -KORD	0	>0	4.26	1.64	
KORD-KMSP-KOFF -KORD	>0	0	5.64	1.86	
KORD-KMSP-KBLV -KORD	>0	0	5.52	.50	
KORD-KMSP-KFFO -KORD	0	>0	6.26	0	
KORD-KOFF-KBLV -KORD	0	>0	5.67	1.01	
KORD-KOFF-KFFO					

-KORD	0	>0	6.79	.13	
KORD-KBLV-KFFO -KORD	0	>0	4.84	.60	
KORD-KMCI-KOFF -KMSP-KORD	>0	0	6.96	1.86	Feasible/Combine
KORD-KMCI-KOFF -KMSP-KCLE-KORD	>0	0	10.34		Unfeasible/Time
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	Feasible/Combine
KORD-KMCI-KOFF -KMSP-KORD	>0	0	6.96	1.86	Feasible/Select
KORD-KDTW-KCLE -KLEX-KORD	>0	0	6.16	1.37	Feasible/Combine
KORD-KDTW-KCLE -KIND-KORD	>0	0	5.76	.82	
KORD-KDTW-KCLE -KLEX-KIND-KORD	0	>0	7.16	1.11	Unfeasible/Cap
KORD-KDTW-KCLE -KLEX-KORD	>0	0	6.16	1.37	Feasible/Select
KORD-KIND-KFFO -KORD	>0	0	3.93	1.02	Feasible/Select
KORD-KBLV-KORD	>0	0	2.60	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KORD-KBLV-KORD
KORD-KIND-KFFO-KORD
KORD-KMCI-KOFF-KMSP-KORD
KORD-KDTW-KCLE-KLEX-KORD

Total Time: 19.65
Aircraft Required: 3

Applicable Days: 88

Clarke-Wright Calculations

Route	C	U	T	S	Remarks

KORD-KDTW-KORD	>0	0	2.83	-	
KORD-KCLE-KORD	>0	0	3.43	-	
KORD-KDSM-KORD	>0	0	3.31	-	
KORD-KMCI-KORD	>0	0	3.93	-	
KORD-KIND-KORD	>0	0	2.11	-	
KORD-KLEX-KORD	>0	0	3.06	-	
KORD-KMSP-KORD	>0	0	3.42	-	
KORD-KOFF-KORD	>0	0	4.08	-	
KORD-KFFO-KORD	0	>0	2.84	-	Feasible/Select
KORD-KBLV-KORD	0	>0	2.60	-	Feasible/Select
KORD-KFFO-KORD	>0	0	2.84	-	
KORD-KBLV-KORD	>0	0	2.60	-	
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	
KORD-KDTW-KDSM -KORD	>0	0	6.14	0	
KORD-KDTW-KMCI -KORD	0	>0	6.73	.03	
KORD-KDTW-KIND -KORD	>0	0	4.24	.70	
KORD-KDTW-KLEX -KORD	0	>0	4.82	1.07	
KORD-KDTW-KMSP -KORD	0	>0	6.17	.08	
KORD-KDTW-KOFF -KORD	>0	0	6.91	0	
KORD-KDTW-KBLV -KORD	0	>0	5.17	.26	
KORD-KDTW-KFFO -KORD	>0	0	4.39	1.28	
KORD-KCLE-KDSM -KORD	>0	0	6.74	0	
KORD-KCLE-KMCI -KORD	>0	0	7.30	.06	
KORD-KCLE-KIND -KORD	>0	0	4.72	.82	
KORD-KCLE-KLEX -KORD	>0	0	5.12	1.37	
KORD-KCLE-KMSP -KORD	>0	0	6.81	.04	
KORD-KCLE-KOFF -KORD	>0	0	7.50	.01	
KORD-KCLE-KBLV -KORD	>0	0	5.67	.36	
KORD-KCLE-KFFO -KORD	>0	0	4.72	1.55	
KORD-KDSM-KMCI -KORD	>0	0	5.12	2.12	

KORD-KDSM-KIND -KORD	>0	0	5.23	.19	
KORD-KDSM-KLEX -KORD	>0	0	6.13	.24	
KORD-KDSM-KMSP -KORD	>0	0	5.04	1.69	
KORD-KDSM-KOFF -KORD	>0	0	5.09	2.30	
KORD-KDSM-KBLV -KORD	>0	0	5.01	.90	
KORD-KDSM-KFFO -KORD	>0	0	6.05	.10	
KORD-KMCI-KIND -KORD	>0	0	5.72	.32	
KORD-KMCI-KLEX -KORD	>0	0	6.54	.45	
KORD-KMCI-KMSP -KORD	0	>0	5.84	1.51	
KORD-KMCI-KOFF -KORD	>0	0	5.40	2.61	Feasible/Combine
KORD-KMCI-KBLV -KORD	>0	0	5.33	1.20	
KORD-KMCI-KFFO -KORD	>0	0	6.53	.24	
KORD-KIND-KMSP -KORD	>0	0	5.50	.03	
KORD-KIND-KLEX -KORD	>0	0	4.06	1.11	
KORD-KIND-KOFF -KORD	>0	0	5.97	.22	
KORD-KIND-KBLV -KORD	>0	0	4.06	.65	
KORD-KIND-KFFO -KORD	>0	0	3.93	1.02	
KORD-KLEX-KMSP -KORD	0	>0	6.44	.04	
KORD-KLEX-KOFF -KORD	>0	0	6.84	.30	
KORD-KLEX-KBLV -KORD	>0	0	4.81	.85	
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	
KORD-KMSP-KOFF -KORD	>0	0	5.64	1.86	
KORD-KMSP-KBLV -KORD	0	>0	5.52	.50	
KORD-KMSP-KFFO -KORD	>0	0	6.26	0	
KORD-KOFF-KBLV -KORD	>0	0	5.67	1.01	
KORD-KOFF-KFFO					

-KORD	>0	0	6.79	.13	
KORD-KBLV-KFFO -KORD	>0	0	4.84	.60	
KORD-KDSM-KOFF -KMCI-KORD	>0	0	6.40	2.62	Feasible/Combine
KORD-KDSM-KOFF -KMCI-KIND-KORD	0	0	8.19	.32	
KORD-KDTW-KCLE -KORD	>0	0	4.47	1.79	Feasible/Select
KORD-KDSM-KOFF -KMCI-KORD	>0	0	6.40	2.62	Feasible/Select
KORD-KLEX-KFFO -KORD	>0	0	4.26	1.64	Feasible/Combine
KORD-KIND-KLEX -KFFO-KORD	>0	0	5.27	1.10	Feasible/Select
KORD-KBLV-KMSP -KORD	0	>0	5.52	.50	Unfeasible/Capacity
KORD-KMSP-KORD	>0	0	3.42	-	Feasible/Select
KORD-KBLV-KORD	>0	0	2.60	-	Feasible/Select

Split Delivery Calculations

** No Splits Possible **

Selected Routes

KORD-KFFO-KORD
KORD-KBLV-KORD
KORD-KBLV-KORD
KORD-KMSP-KORD
KORD-KDTW-KCLE-KORD
KORD-KMCI-KOFF-KDSM-KORD
KORD-KIND-KLEX-KFFO-KORD

Total Time: 27.60
Aircraft Required: 4

Applicable Days: 75-78

No Routes or Aircraft Required

Appendix N: Kulkarni-Bhave Input for Day One of Philadelphia Network

```
..TITLE
Philly one

..OBJECTIVE MINIMIZE
*time
[[ 138 X12 + 163 X13 + 167 X14 + 193 X15 + 201 X16 +
      38 X21 + 133 X23 + 193 X24 + 200 X25 + 184 X26 +
      63 X31 + 133 X32 + 224 X34 + 231 X35 + 208 X36 +
      67 X41 + 193 X42 + 224 X43 + 153 X45 + 198 X46 +
      93 X51 + 200 X52 + 231 X53 + 153 X54 + 157 X56 +
     101 X61 + 184 X62 + 208 X63 + 198 X64 + 157 X65 ]] +
     0 ( Y2 + Y3 + Y4 + Y5 + Y6 + V2 + V3 + V4 +
         V5 + V6 )

..CONSTRAINTS
* nodes visited once
X12 + X32 + X42 + X52 + X62 = 1
X13 + X23 + X43 + X53 + X63 = 1
X14 + X24 + X34 + X54 + X64 = 1
X15 + X25 + X35 + X45 + X65 = 1
X16 + X26 + X36 + X46 + X56 = 1
X21 + X23 + X24 + X25 + X26 = 1
X31 + X32 + X34 + X35 + X36 = 1
X41 + X42 + X43 + X45 + X46 = 1
X51 + X52 + X53 + X54 + X56 = 1
X61 + X62 + X63 + X64 + X65 = 1

* all vehicles used
X12 + X13 + X14 + X15 + X16 = 4
X21 + X31 + X41 + X51 + X61 = 4

* subtour capacity
Y2 - Y3 + 48 X23 <= 8
Y2 - Y4 + 48 X24 <= 8
Y2 - Y5 + 48 X25 <= 8
Y2 - Y5 + 48 X26 <= 8
Y2 - Y6 + 48 X26 <= 8
Y3 - Y2 + 48 X32 <= 21
Y3 - Y4 + 48 X34 <= 21
Y3 - Y5 + 48 X35 <= 21
Y3 - Y6 + 48 X36 <= 21
Y4 - Y2 + 48 X42 <= 43
Y4 - Y3 + 48 X43 <= 43
Y4 - Y5 + 48 X45 <= 43
Y4 - Y6 + 48 X46 <= 43
```

```
Y5 - Y2 + 48 X52 <= 28
Y5 - Y3 + 48 X53 <= 28
Y5 - Y4 + 48 X54 <= 28
Y5 - Y6 + 48 X56 <= 28
Y6 - Y2 + 48 X62 <= 23
Y6 - Y3 + 48 X63 <= 23
Y6 - Y4 + 48 X64 <= 23
Y6 - Y5 + 48 X65 <= 23
* subtour block hours
V2 - V3 + 1000 X23 <= 867
V2 - V4 + 1000 X24 <= 807
V2 - V5 + 1000 X25 <= 800
V2 - V6 + 1000 X26 <= 816
V3 - V2 + 1000 X32 <= 867
V3 - V4 + 1000 X34 <= 776
V3 - V5 + 1000 X35 <= 769
V3 - V6 + 1000 X36 <= 792
V4 - V2 + 1000 X42 <= 807
V4 - V3 + 1000 X43 <= 776
V4 - V5 + 1000 X45 <= 847
V4 - V6 + 1000 X46 <= 802
V5 - V2 + 1000 X52 <= 800
V5 - V3 + 1000 X53 <= 769
V5 - V4 + 1000 X54 <= 847
V5 - V6 + 1000 X56 <= 843
V6 - V2 + 1000 X62 <= 816
V6 - V3 + 1000 X63 <= 792
V6 - V4 + 1000 X64 <= 802
V6 - V5 + 1000 X65 <= 843
```

Appendix O: Kulkarni-Bhave Input for Day Eight of Philadelphia Network

```
..TITLE
Philly two

..OBJECTIVE MINIMIZE
*time
[[ 138 X12 + 163 X13 + 167 X14 + 193 X15 + 201 X16 +
    38 X21 + 133 X23 + 193 X24 + 200 X25 + 184 X26 +
    63 X31 + 133 X32 + 224 X34 + 231 X35 + 208 X36 +
    67 X41 + 193 X42 + 224 X43 + 153 X45 + 198 X46 +
    93 X51 + 200 X52 + 231 X53 + 153 X54 + 157 X56 +
    101 X61 + 184 X62 + 208 X63 + 198 X64 + 157 X65 ]] +
    0 ( Y2 + Y3 + Y4 + Y5 + Y6 + V2 + V3 + V4 +
        V5 + V6 )

..CONSTRAINTS
* nodes visited once
X12 + X32 + X42 + X52 + X62 = 1
X13 + X23 + X43 + X53 + X63 = 1
X14 + X24 + X34 + X54 + X64 = 1
X15 + X25 + X35 + X45 + X65 = 1
X16 + X26 + X36 + X46 + X56 = 1
X21 + X23 + X24 + X25 + X26 = 1
X31 + X32 + X34 + X35 + X36 = 1
X41 + X42 + X43 + X45 + X46 = 1
X51 + X52 + X53 + X54 + X56 = 1
X61 + X62 + X63 + X64 + X65 = 1

* all vehicles used
X12 + X13 + X14 + X15 + X16 = 3
X21 + X31 + X41 + X51 + X61 = 3

* subtour capacity
Y2 - Y3 + 48 X23 <= 4
Y2 - Y4 + 48 X24 <= 4
Y2 - Y5 + 48 X25 <= 4
Y2 - Y5 + 48 X26 <= 4
Y3 - Y2 + 48 X32 <= 33
Y3 - Y4 + 48 X34 <= 33
Y3 - Y5 + 48 X35 <= 33
Y3 - Y6 + 48 X36 <= 33
Y4 - Y2 + 48 X42 <= 45
Y4 - Y3 + 48 X43 <= 45
Y4 - Y5 + 48 X45 <= 45
Y4 - Y6 + 48 X46 <= 45
```

```
Y5 - Y2 + 48 X52 <= 10
Y5 - Y3 + 48 X53 <= 10
Y5 - Y4 + 48 X54 <= 10
Y5 - Y6 + 48 X56 <= 10
Y6 - Y2 + 48 X62 <= 43
Y6 - Y3 + 48 X63 <= 43
Y6 - Y4 + 48 X64 <= 43
Y6 - Y5 + 48 X65 <= 43
* subtour block hours
V2 - V3 + 1000 X23 <= 867
V2 - V4 + 1000 X24 <= 807
V2 - V5 + 1000 X25 <= 800
V2 - V6 + 1000 X26 <= 816
V3 - V2 + 1000 X32 <= 867
V3 - V4 + 1000 X34 <= 776
V3 - V5 + 1000 X35 <= 769
V3 - V6 + 1000 X36 <= 792
V4 - V2 + 1000 X42 <= 807
V4 - V3 + 1000 X43 <= 776
V4 - V5 + 1000 X45 <= 847
V4 - V6 + 1000 X46 <= 802
V5 - V2 + 1000 X52 <= 800
V5 - V3 + 1000 X53 <= 769
V5 - V4 + 1000 X54 <= 847
V5 - V6 + 1000 X56 <= 843
V6 - V2 + 1000 X62 <= 816
V6 - V3 + 1000 X63 <= 792
V6 - V4 + 1000 X64 <= 802
V6 - V5 + 1000 X65 <= 843
```

Appendix P: VP-EXPERT Prototype for the Denver Network

This expert system, coded in VP-EXPERT, is the product of a joint effort with Carter. In addition to limitations described in Chapter five, this system will accept patient loads no larger than ninety-six for each airport. This is an arbitrary number and does not reflect a program limitation. To operate the system, a user merely answers the on-screen prompts, which ask for a daily patient load for each airport. The resulting optimal routes do not display Denver as the origin or destination. Also, the system does not include route times. These deficiencies can be remedied with little difficulty. An example of the output for day seven follows the program code.

VP-EXPERT System Code for the Denver Network

```
RUNTIME;
ACTIONS
PRINTON
    DISPLAY "THE DENVER HUB ROUTE DETERMINATION EXPERT
SYSTEM

    This system finds the optimal routing using the
Clarke-Wright vehicle routing algorithm. Routing is
the optimal only for Civil Reserve Air Fleet MD80s on
aeromedical evacuation missions.

            Press any key to begin.
~"
FIND HILL
FIND ALBQ
FIND BLIS
FIND WICH
FIND HIL
FIND ABQ
FIND BIF
```

```
FIND IAB
HAB = (HIL + ABQ + BIF)
ABI = (ABQ + BIF + IAB)
HBI = (HIL + BIF + IAB)
HA = (HIL + ABQ)
HB = (HIL + BIF)
HI = (HIL + IAB)
AB = (ABQ + BIF)
AI = (ABQ + IAB)
BI = (BIF + IAB)
FIND WHO
FIND ROUTES
FIND STAT;
RULE 1
IF HILL > 47
THEN HIL = (HILL - 48)
DISPLAY "HILL"
ELSE HIL = (HILL);
RULE 2
IF ALBQ > 47
THEN ABQ = (ALBQ - 48)
DISPLAY "ALBQ"
ELSE ABQ = (ALBQ);
RULE 3
IF BLIS > 47
THEN BIF = (BLIS - 48)
DISPLAY "BLIS"
ELSE BIF = (BLIS);
RULE 4
IF WICH > 47
THEN IAB = (WICH - 48)
DISPLAY "WICH"
ELSE IAB = (WICH);
RULE 10
IF ROUTES = DONE
THEN STAT = 0
DISPLAY "
ROUTING COMPLETE

Each separate line is a route!

HILL is Hill AFB       ({HILL} patients were entered for Hill
                        AFB)
WICH is Wichita        ({WICH} patients were entered for
                           Wichita)
ALBQ is Albuquerque    ({ALBQ} patients were entered for
                           Albuquerque)
BLIS is Ft. Bliss     ({BLIS} patients were entered for Ft.
                          Bliss)";
RULE 11
IF IAB > 0 AND
```

```
HIL > 0 AND
ABQ > 0 AND
BIF > 0
THEN WHO = 0;
RULE 12
IF IAB = 0 AND
HIL > 0 AND
ABQ > 0 AND
BIF > 0
THEN WHO = 4;
RULE 13
IF HIL > 0 AND
ABQ = 0 AND
IAB > 0 AND
BIF > 0
THEN WHO = 3;
RULE 14
IF HIL = 0 AND
ABQ > 0 AND
BIF > 0 AND
IAB > 0
THEN WHO = 2;
RULE 15
IF ABQ > 0 AND
HIL > 0 AND
IAB > 0 AND
BIF = 0
THEN WHO = 1;
RULE 16
IF HIL = 0 AND
BIF > 0 AND
IAB > 0 AND
ABQ = 0
THEN WHO = 5;
RULE 17
IF ABQ > 0 AND
IAB > 0 AND
BIF = 0 AND
HIL = 0
THEN WHO = 6;
RULE 18
IF ABQ > 0 AND
BIF > 0 AND
HIL = 0 AND
IAB = 0
THEN WHO = 7;
RULE 19
IF HIL > 0 AND
IAB > 0 AND
BIF = 0 AND
ABQ = 0
```

```
THEN WHO = 8;
RULE 20
IF IAB = 0 AND
HIL > 0 AND
ABQ = 0 AND
BIF > 0
THEN WHO = 9;
RULE 21
IF HIL > 0 AND
ABQ > 0 AND
IAB = 0 AND
BIF = 0
THEN WHO = 10;
RULE 22
IF HIL = 0 AND
ABQ = 0 AND
BIF = 0 AND
IAB > 0
THEN WHO = 11;
RULE 23
IF ABQ = 0 AND
HIL = 0 AND
IAB = 0 AND
BIF > 0
THEN WHO = 12;
RULE 24
IF HIL = 0 AND
BIF = 0 AND
IAB = 0 AND
ABQ > 0
THEN WHO = 13;
RULE 25
IF ABQ = 0 AND
IAB = 0 AND
BIF = 0 AND
HIL > 0
THEN WHO = 14;
RULE 26
IF ABQ = 0 AND
BIF = 0 AND
HIL = 0 AND
IAB = 0
THEN WHO = 15;
RULE 27
IF WHO = 0 AND
HAB < 49
THEN ROUTES = DONE
DISPLAY"HILL-ALBQ-BLIS
WICH";
RULE 28
IF WHO = 0 AND
```

```
ABI < 49
THEN ROUTES = DONE
DISPLAY"ALBQ-BLIS-WICH
HILL";
RULE 29
IF AB < 49 AND
HI < 49 AND
WHO = 0
THEN ROUTES = DONE
DISPLAY"ALBQ-BLIS
HILL-WICH";
RULE 30
IF WHO = 0 AND
HBI < 49
THEN ROUTES = DONE
DISPLAY"HILL-BLIS-WICH
ALBQ";
RULE 31
IF WHO = 0 AND
BI < 49 AND
HA < 49
THEN ROUTES = DONE
DISPLAY"BLIS-WICH
HILL-ALBQ";
RULE 32
IF WHO = 0 AND
HAI < 49
THEN ROUTES = DONE
DISPLAY"HILL-ALBQ-WICH
BLIS";
RULE 33
IF WHO = 0 AND
HB < 49 AND
AI < 49
THEN ROUTES = DONE
DISPLAY"HILL-BLIS
ALBQ-WICH";
RULE 34
IF WHO = 0 AND
AB < 49
THEN ROUTES = DONE
DISPLAY"ALBQ-BLIS
HILL
WICH";
RULE 35
IF WHO = 0 AND
BI < 49
THEN ROUTES = DONE
DISPLAY"BLIS-WICH
HILL
ALBQ";
```

```
RULE 36
IF WHO = 0 AND
HB < 49
THEN ROUTES = DONE
DISPLAY"HILL-BLIS
ALBQ
WICH";
RULE 37
IF WHO = 0 AND
HA < 49
THEN ROUTES = DONE
DISPLAY"HILL-ALBQ
BLIS
WICH";
RULE 38
IF WHO = 0 AND
AI < 0
THEN ROUTES = DONE
DISPLAY"ALBQ-WICH
HILL
BLIS";
RULE 39
IF WHO = 0 AND
HI < 49
THEN ROUTES = DONE
DISPLAY"HILL-WICH
BLIS
ALBQ";
RULE 40
IF WHO = 0
THEN ROUTES = DONE
DISPLAY"HILL
ALBQ
BLIS
WICH";
RULE 41
IF WHO = 1 AND
HAI < 49
THEN ROUTES = DONE
DISPLAY"HILL-ALBQ-WICH";
RULE 42
IF WHO = 1 AND
HA < 49
THEN ROUTES = DONE
DISPLAY"HILL-ALBQ
WICH";
RULE 43
IF WHO = 1 AND
AI < 49
THEN ROUTES = DONE
DISPLAY"ALBQ-WICH
```

```
HILL";
RULE 44
IF WHO = 1 AND
HI < 49
THEN ROUTES = DONE
DISPLAY"HILL-WICH
ALBQ";
RULE 45
IF WHO = 1
THEN ROUTES = DONE
DISPLAY"HILL
ALBQ
WICH";
RULE 46
IF WHO = 2 AND
ABI < 49
THEN ROUTES = DONE
DISPLAY"ALBQ-BLIS-WICH";
RULE 47
IF WHO = 2 AND
AB < 49
THEN ROUTES = DONE
DISPLAY"ALBQ-BLIS
WICH";
RULE 48
IF WHO = 2 AND
BI < 49
THEN ROUTES = DONE
DISPLAY"BLIS-WICH
ALBQ";
RULE 49
IF WHO = 2 AND
AI < 49
THEN ROUTES = DONE
DISPLAY"ALBQ-WICH
BLIS";
RULE 50
IF WHO = 2
THEN ROUTES = DONE
DISPLAY"BLIS
ALBQ
WICH";
RULE 51
IF WHO = 3 AND
HBI < 49
THEN ROUTES = DONE
DISPLAY"HILL-BLIS-WICH";
RULE 52
IF WHO = 3 AND
BI < 49
THEN ROUTES = DONE
```

```
DISPLAY"BLIS-WICH
HILL";
RULE 53
IF WHO = 3 AND
HB < 49
THEN ROUTES = DONE
DISPLAY"HILL-BLIS
WICH";
RULE 54
IF WHO = 3 AND
HI < 49
THEN ROUTES = DONE
DISPLAY"HILL-WICH
BLIS";
RULE 55
IF WHO = 3
THEN ROUTES = DONE
DISPLAY"HILL
BLIS
WICH";
RULE 56
IF WHO = 4 AND
HAB < 49
THEN ROUTES = DONE
DISPLAY"HILL-ALBQ-BLIS";
RULE 57
IF WHO = 4 AND
AB < 49
THEN ROUTES = DONE
DISPLAY"ALBQ-BLIS
HILL";
RULE 58
IF WHO = 4 AND
HB < 49
THEN ROUTES = DONE
DISPLAY"HILL-BLIS
ALBQ";
RULE 59
IF WHO = 4 AND
HA < 49
THEN ROUTES = DONE
DISPLAY"HILL-ALBQ
BLIS";
RULE 60
IF WHO = 4
THEN ROUTES = DONE
DISPLAY"BLIS
ALBQ
HILL";
RULE 61
IF WHO = 5 AND
```

```
BI < 49
THEN ROUTES = DONE
DISPLAY"BLIS-WICH";
RULE 62
IF WHO = 5
THEN ROUTES = DONE
DISPLAY"BLIS
WICH";
RULE 63
IF WHO = 6 AND
AI < 49
THEN ROUTES = DONE
DISPLAY"ALBQ-WICH";
RULE 64
IF WHO = 6
THEN ROUTES = DONE
DISPLAY"ALBQ
WICH";
RULE 65
IF WHO = 7 AND
AB < 49
THEN ROUTES = DONE
DISPLAY"ALBQ-BLIS";
RULE 66
IF WHO = 7
THEN ROUTES = DONE
DISPLAY"BLIS
ALBQ";
RULE 67
IF WHO = 8 AND
HI < 49
THEN ROUTES = DONE
DISPLAY"HILL-WICH";
RULE 68
IF WHO = 8
THEN ROUTES = DONE
DISPLAY"HILL
WICH";
RULE 69
IF WHO = 9 AND
HB < 49
THEN ROUTES = DONE
DISPLAY"HILL-BLIS";
RULE 70
IF WHO = 9
THEN ROUTES = DONE
DISPLAY"BLIS
HILL";
RULE 71
IF WHO = 10 AND
HA < 49
```

```
THEN ROUTES = DONE
DISPLAY"HILL-ALBQ";
RULE 72
IF WHO = 10
THEN ROUTES = DONE
DISPLAY"HILL
ALBQ";
RULE 73
IF WHO = 11
THEN ROUTES = DONE
DISPLAY "WICH";
RULE 74
IF WHO = 12
THEN ROUTES = DONE
DISPLAY"BLIS";
RULE 75
IF WHO = 13
THEN ROUTES = DONE
DISPLAY "ALBQ";
RULE 76
IF WHO = 14
THEN ROUTES = DONE
DISPLAY"HILL";
RULE 77
IF WHO = 15
THEN ROUTES = DONE
DISPLAY"NO PATIENTS WERE ENTERED!";
ASK HILL:"How many patients need airlift to Hill AFB?";
ASK ALBQ:"How many patients need airlift to Albuquerque?";
ASK BLIS:"How many patients need airlift to Ft. Bliss?";
ASK WICH:"How many patients need airlift to Wichita?";
```

Example Output for Day One

```
THE DENVER HUB ROUTE DETERMINATION EXPERT SYSTEM

     This system finds the optimal routing using the
Clarke-Wright vehicle routing algorithm.  Routing is
the optimal only for Civil Reserve Air Fleet MD80s on
aeromedical evacuation missions.

               Press any key to begin.
```

```
BLIS
ALBQ-BLIS
HILL-WICH

ROUTING COMPLETE

Each separate line is a route!

HILL stands for Hill AFB     (15 patients were entered for Hill AFB)
WICH stands for Wichita      (9 patients were entered for Wichita)
ALBQ stands for Albuquerque  (13 patients were entered for Albuquerque)
BLIS stands for Ft. Bliss    (77 patients were entered for Ft. Bliss)
```

The output agrees with the results contained in Appendix I. Note: ICAOS are not used in the output. The abbreviations are self-explanatory.

Vita

Captain Michael D. Burnes [redacted] He graduated from high school in Rome, Georgia in 1979 and entered the U.S. Air Force Academy that summer. After graduating from the Academy with a history degree in 1983, he was assigned to the 552nd Airborne Warning and Control Wing, Tinker AFB, OK. Captain Burnes held a variety of positions in the wing, including Weapons Director, Instructor Weapons Director, Stan-Eval Weapons Director and Tactics Officer. He served in the 552nd Airborne Warning and Control Wing until entering the School of Engineering, Air Force Institute of Technology in August of 1988.